REPLACED BY ART 34 AMDT

CLAIMS

1. Process for inking a printing plate attached to a holder, with a thermoplastic ink, to be used in pad printing, whereby a relative movement is maintained between the holder and an ink tank filled with thermoplastic ink, characterised in that the holder or the ink tank, or both these components are heated at the temperature required for the thermoplastic ink.

2. Process according to claim 1, characterised in that as an ink tank, a heated ink tank is used, with circular or oval doctor blade of a hard material, such as hard metal or plastic material in the shape of a monolithic component of undeformable material, in which at the periphery a circular or oval canal is made for attaching above said doctor blade by snap connection, as well as for attaching above said doctor blade to this component by glueing.

3. Process according to claim 1, characterised in that as an ink tank, a device is used consisting of the combination of a heated ink tank and at least one doctor blade, of which at least the bottom edge which is contacting the printing plate, is adjusted with respect to the printing plate at a negative angle, measured with respect to the inked portion of the printing plate to be scraped off, and without changing the position of the doctor blade, a relative movement of the doctor blade with respect to the printing plate is generated, on the one hand, in a direction to ink the printing plate, and on the other hand, in the other direction, to scrape off the ink from the printing plate.

4. Ink tank to be used in the application of the process according to claim 2, characterised in that it is realised in the shape of a monolithic component of an undeformable material, in which, at the periphery a circular or oval canal is made for attaching above said doctor blade by snap connection, as well as for attaching above said doctor blade to this component by glueing.

5. Ink tank according to claim 4, characterised in that above said hard material is a synthetic substance.

6. Ink tank according to claim 5, characterised in that above said synthetic substance is a polyacetate.

7. Ink tank according to any one of claims 5 and 6, characterised in that above said doctor blade of above said synthetic substance is attached by an adhesive.

8. Ink tank according to claim 4, characterised in that above said doctor blade of above said synthetic substance is attached to the monolithic component by a snap connection.

9. Ink tank according to any one of claims 4-5, characterised in that above said doctor blade, during spraying or casting of above said synthetic substance of which above said ink tank is made, was joined to it.

10. Heated ink tank for implementing the process according to claim 3, characterised in that it consists of the combination of

a) an ink tank for inking the printing plate during a relative movement of the inking plate with respect to this ink tank, and of

b) at least one doctor blade of which the bottom edge which is contacting the printing plate, is adjusted with respect to the printing plate at a negative angle, meaning an angle measured with respect to the inked portion of the printing plate that has yet to be scraped off.

11. Ink tank according to claim 10, characterised in that above said doctor blade is adjusted at a negative angle between substantially 90 and substantially 180°.

12. Ink tank according to any one of claims 10 and 11, characterised in that it is elongated and forms with above said doctor blade an elongated ink gap.

13. Ink tank according to claim 12, characterised in that above said doctor blade and the ink tank are mounted on a common elongated housing.

14. Ink tank according ot claim 13, characterised in that above said doctor blade and above said elongated housing form a whole.

15. Ink tank according to any one of claims 10-14, characterised in that two doctor blades are mounted facing each other.

16. Ink tank according to any one of claims 10-15,

characterised in that above said doctor blade forms a closed circle and that a portion of the doctor blade extends according to above said negative angle.

17. Ink tank according to any one of claims 13-16, characterised in that in above said housing, a heating resistance is mounted.

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/BE 00/00044

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B41F17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B41F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 40 15 684 A (TAMPOFLEX GMBH) 21 November 1991 (1991-11-21) column 1, line 5 - line 27; figures 1,2	1,10, 12-15,17
Y	PATENT ABSTRACTS OF JAPAN vol. 15, no. 491 (M-1190), 12 December 1991 (1991-12-12) & JP 03 213341 A (THINK LAB KK), 18 September 1991 (1991-09-18) abstract	1,10, 12-15,17
P,A	EP 0 917 953 A (PRINTING INTERNATIONAL) 26 May 1999 (1999-05-26) the whole document	1-17

-/--

[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 August 2000	29/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Deprun, M

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Interna al Application No
PCT/BE 00/00044

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 736 380 A (PRINTING INTERNATIONAL) 9 October 1996 (1996-10-09) column 1, line 54 -column 2, line 21; claim 1; figure 1	1,4-6,10
A	WO 97 37850 A (TECAPRINT AG) 16 October 1997 (1997-10-16) page 4, line 18 - line 29; figures 1,2	1,10, 12-15,17
A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 385 (M-864), 25 August 1989 (1989-08-25) & JP 01 136747 A (SEIKO EPSON CORP), 30 May 1989 (1989-05-30) abstract	1,10,11
A	PATENT ABSTRACTS OF JAPAN vol. 17, no. 623 (M-1511), 17 November 1993 (1993-11-17) & JP 05 193115 A (MITSUBISHI HEAVY IND LTD), 3 August 1993 (1993-08-03) abstract	1,10
A	DE 40 27 587 C (TAMPOPRINT GMBH) 2 October 1991 (1991-10-02) column 6, line 66 -column 7, line 33; figure 4	1,10, 12-15,17

1

INTERNATIONAL SEARCH REPORT

...ormation on patent family members

Internal Application No
PCT/BE 00/00044

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
DE 4015684	A	21-11-1991	WO	9117888 A	28-11-1991
JP 03213341	A	18-09-1991	JP	2565782 B	18-12-1996
EP 917953	A	26-05-1999	BE	1011561 A	05-10-1999
EP 736380	A	09-10-1996	BE	1009272 A	07-01-1997
WO 9737850	A	16-10-1997	AU	2147997 A	29-10-1997
			DE	59701257 D	20-04-2000
			EP	0894049 A	03-02-1999
			ES	2145588 T	01-07-2000
			US	6067904 A	30-05-2000
JP 01136747	A	30-05-1989	NONE		
JP 05193115	A	03-08-1993	NONE		
DE 4027587	C	02-10-1991	AT	108142 T	15-07-1994
			DE	59102113 D	11-08-1994
			EP	0473947 A	11-03-1992
			US	5222433 A	29-06-1993

U 013688-5

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
7023GD1/PV		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/BE00/00044	21/04/2000	29/04/1999
International Patent Classification (IPC) or national classification and IPC B41F17/00		
Applicant PRINTING INTERNATIONAL et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
18/11/2000	26.07.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer D'Incecco, R Telephone No. +49 89 2399 2788

Form PCT/IPEA/409 (cover sheet) (January 1994)

EXPRESS MAIL LABEL NO.: EV 011018890 US

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/BE00/00044

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, pages:

1-8	as originally filed			
3a	as received on	17/05/2001	with letter of	16/05/2001

Claims, No.:

1-17	as received on	17/05/2001	with letter of	16/05/2001

Drawings, sheets:

1/5-5/5	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/BE00/00044

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-17
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-17
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-17
	No:	Claims	

2. Citations and explanations
   see separate sheet

INTERNATIONAL PRELIMINARY EXAMINATION REPORT - SEPARATE SHEET

International application No. PCT/BE00/00044

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

According to the description of the present application, the use of thermoplastic ink in pad printing is known. This method, however, does neither provide sufficient reliability nor a constant quality.

This drawback has been overcome by the present invention in that the holder or the ink tank, or both these components are heated at the temperature required for the thermoplastic ink, wherein the ink is heated to about 80°C.

These features are also present implicitly in claims 4 and 10.

The cited prior art does neither disclose nor clearly suggest a process with the features of claim 1 and an ink tank with the features of claims 4 and 10 respectively.

Claims 1, 4 and 10 are therefore novel and involve an inventive step.

Together with the dependent claims 2, 3, 5-9 and 11-17, the independent claims 1, 2 and 10 meet the requirements of Article 33(1)-(4) PCT.

PATENT COOPERATION TREATY

REC'D 30 JUL 2001
WIPO PCT

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
7023GD1/PV		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/BE00/00044	21/04/2000	29/04/1999
International Patent Classification (IPC) or national classification and IPC B41F17/00		
Applicant PRINTING INTERNATIONAL et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
18/11/2000	26.07.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer D'Incecco, R Telephone No. +49 89 2399 2788

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/BE00/00044

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-8	as originally filed			
3a	as received on	17/05/2001	with letter of	16/05/2001

Claims, No.:

1-17	as received on	17/05/2001	with letter of	16/05/2001

Drawings, sheets:

1/5-5/5	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-17
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-17
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-17
	No:	Claims	

2. Citations and explanations
   see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

According to the description of the present application, the use of thermoplastic ink in pad printing is known. This method, however, does neither provide sufficient reliability nor a constant quality.

This drawback has been overcome by the present invention in that the holder or the ink tank, or both these components are heated at the temperature required for the thermoplastic ink, wherein the ink is heated to about 80°C.

These features are also present implicitly in claims 4 and 10.

The cited prior art does neither disclose nor clearly suggest a process with the features of claim 1 and an ink tank with the features of claims 4 and 10 respectively.

Claims 1, 4 and 10 are therefore novel and involve an inventive step.

Together with the dependent claims 2, 3, 5-9 and 11-17, the independent claims 1, 2 and 10 meet the requirements of Article 33(1)-(4) PCT.

PATENT ABSTRACTS OF JAPAN vol. 15, no. 491 (M-1190), 12 December 1991 (1991-12-12) & JP 03 213341 A (THINK LAB KK), 18 September 1991 (1991-09-18) discloses a process for inking an etched printing cylinder with an ink which reduces viscosity by heating, whereby a relative movement is maintained between the etched surface and an ink tank filled with said ink, wherein the ink tank is heated at the remperature required for this ink. However, these teachings are not straightforwardly suitable for thermoplastic ink.

AMENDED CLAIMS

1. Process for inking a printing plate attached to a holder, with a thermoplastic ink, to be used in pad printing, whereby a relative movement is maintained between the holder and an ink tank filed with thermoplastic ink, characterised in that the holder or the ink tank, or both these components are heated at the temperature required for the thermoplastic ink, wherein the ink is heated to about 80°C.

2. Process according to claim 1, characterised in that as an ink tank, a heated ink tank is used, with circular or oval doctor blade of a hard material, such as hard metal or plastic material in the shape of a monolithic component of undeformable material, in which at the periphery a circular or oval canal is made for attaching above said doctor blade by snap connection, as well as for attaching above said doctor blade to this component by glueing.

3. Process according to claim 1, characterised in that as an ink tank, a device is used consisting of the combination of a heated ink tank and at least one doctor blade, of which at least the bottom edge which is contacting the printing plate; is adjusted with respect to the printing plate at a negative angle, measured with respect to the inked portion of the printing plate to be scraped off, and without changing the position of the doctor blade, a relative movement of the doctor blade with respect to the printing plate is generated, on the one hand, in a direction to ink the printing plate, and on the other hand, in the other direction, to scrap off the ink from the printing plate.

4. Ink tank to be used in the application of the process according to claim 2, characterised in that it is heatable being provided with circular or oval doctor blade of hard material, such as hard metal or plastic material, and in that it is realised in the shape of a monolithic component of an undeformable material, in which, at the periphery a circular or oval canal is made for attaching above said doctor blade by

snap connection, as well as for attaching above said doctor blade to this component by glueing.

5. Ink tank according to claim 4, characterised in that above said hard material is a synthetic substance.

6. Ink tank according to claim 5, characterised in that above said synthetic substance is a polyacetate.

7. Ink tank according to any one of claims 5 and 6, characterised in that above said doctor blade of above said synthetic substance is attached by an adhesive.

8. Ink tank according to claim 4, characterised in that above said doctor blade of above said synthetic substance is attached to the monolithic component by a snap connection.

9. Ink tank according to any one of claim 4-5, characterised in that above said doctor blade, during spraying or casting of above said synthetic substance of which above said ink tank is made, was joined to it.

10. Heatable ink tank for implementing the process according to claim 3, characterised in that it consists of the combination of

a) an ink tank for inking the printing plate during a relative movement of the printing plate with respect to this ink tank, and of

b) at least one doctor blade of which the bottom edge which is contacting the printing plate, is adjusted with respect to the printing plate at a negative angle, meaning an angle measured with respect to the inked portion of the printing plate that has yet to be scraped off.

11. Ink tank according to claim 10, characterised in that above said doctor blade is adjusted at a negative angle between substantially 90 and substantially 180°.

12. Ink tank according to any one of claims 10 and 11, characterised in that it is elongated and forms with above said doctor blade an elongated ink gap.

13. Ink tank according to claim 12, characterised in that above said doctor blade and the ink tank are mounted on a common elongated housing.

14. Ink tank according to claim 13, characterised in that above said doctor blade and above said elongated housing form a whole.

15. Ink tank according to any one of claims 10-14, characerised in that two doctor blades are mounted facing each other.

16. Ink tank according to any one of claims 10-15, characterised in that above said doctor blade forms a closed circle and that a portion of the doctor blade extends according to above said negative angle.

17. Ink tank according to any one of claims 13-16, characterised in that above said housing, a heating resistance is mounted.

RECORD COPY

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

PCT/BE00/00044

International Application No.

21 AVR. 2000 (21-04-2000)

International Filing Date

RO/BE - PCT INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference (if desired) (12 characters maximum) 7023GD1/PV

Box No. I TITLE OF INVENTION Process for inking a printing plate with thermoplastic inks and ink tanks to be used therein(Werkwijze voor het met thermoplastische inkten beïnkten van een cliché en hierbij te gebruiken inktreservoirs)

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

PRINTING INTERNATIONAL
Industriepark
Ambachtenlaan 12
B-9880 Aalter (Belgique)

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State *(that is, country)* of nationality: BE

State *(that is, country)* of residence: BE

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

DE VOLDER, Laurent
Alterstraat 11
B-9880 Aalter (Belgique)

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: BE

State *(that is, country)* of residence: BE

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

VAN CUTSEM, Paul
avenue Winston Churchill 152/6
B-1180 Bruxelles (Belgique)

Telephone No. +32 2 343 6118

Facsimile No. +32 2 346 4296

Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes: at least one must be marked)*:

Regional Patent

☒ **AP** **ARIPO Patent:** **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SL** Sierra Leone, **SZ** Swaziland, **TZ** United Republic of Tanzania, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT

☒ **EA** **Eurasian Patent:** **AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT

☒ **EP** **European Patent:** **AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **CY** Cyprus, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT

☒ **OA** **OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **GW** Guinea-Bissau, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

☒ **AE** United Arab Emirates
☒ **AL** Albania
☒ **AM** Armenia
☒ **AT** Austria
☒ **AU** Australia
☐ **AZ** Azerbaijan
☒ **BA** Bosnia and Herzegovina
☒ **BB** Barbados
☒ **BG** Bulgaria
☒ **BR** Brazil
☐ **BY** Belarus
☒ **CA** Canada
☒ **CH and LI** Switzerland and Liechtenstein
☒ **CN** China
☒ **CR** Costa Rica
☒ **CU** Cuba
☒ **CZ** Czech Republic
☒ **DE** Germany
☒ **DK** Denmark
☒ **DM** Dominica
☒ **EE** Estonia
☒ **ES** Spain
☒ **FI** Finland
☒ **GB** United Kingdom
☒ **GD** Grenada
☒ **GE** Georgia
☒ **GH** Ghana
☐ **GM** Gambia
☒ **HR** Croatia
☒ **HU** Hungary
☒ **ID** Indonesia
☒ **IL** Israel
☒ **IN** India
☒ **IS** Iceland
☒ **JP** Japan
☒ **KE** Kenya
☒ **KG** Kyrgyzstan
☒ **KP** Democratic People's Republic of Korea
☒ **KR** Republic of Korea
☒ **KZ** Kazakhstan
☒ **LC** Saint Lucia
☒ **LK** Sri Lanka
☒ **LR** Liberia
☒ **LS** Lesotho
☒ **LT** Lithuania
☒ **LU** Luxembourg
☒ **LV** Latvia
☒ **MA** Morocco
☒ **MD** Republic of Moldova
☒ **MG** Madagascar
☒ **MK** The former Yugoslav Republic of Macedonia
☒ **MN** Mongolia
☒ **MW** Malawi
☒ **MX** Mexico
☒ **NO** Norway
☒ **NZ** New Zealand
☒ **PL** Poland
☒ **PT** Portugal
☒ **RO** Romania
☒ **RU** Russian Federation
☐ **SD** Sudan
☒ **SE** Sweden
☒ **SG** Singapore
☒ **SI** Slovenia
☒ **SK** Slovakia
☒ **SL** Sierra Leone
☒ **TJ** Tajikistan
☒ **TM** Turkmenistan
☒ **TR** Turkey
☒ **TT** Trinidad and Tobago
☒ **TZ** United Republic of Tanzania
☒ **UA** Ukraine
☐ **UG** Uganda
☒ **US** United States of America
☒ **UZ** Uzbekistan
☒ **VN** Viet Nam
☒ **YU** Yugoslavia
☒ **ZA** South Africa
☐ **ZW** Zimbabwe

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

☒ **DZ** ~~[Algérie]~~ Algeria
☒ **AG** Antigua ~~and~~ & Barbuda

** delet RoiBE
* RoiBe

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)*

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) (29.04.1999) 29 april 1999	99870075.1		EP	
item (2)				
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): _____

* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*

ISA/

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority):*

Date *(day/month/year)* | Number | Country *(or regional Office)*

EP

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	3
description (excluding sequence listing part)	8
claims	3
abstract	1
drawings	5
sequence listing part of description	
Total number of sheets	20

This international application is **accompanied by** the item(s) marked below:

1. ☒ fee calculation sheet
2. ☐ separate signed power of attorney will follow
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other *(specify)*:

Figure of the drawings which should accompany the abstract: 7

Language of filing of the international application: English

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Paul Van Cutsem
Authorised Representative

29.4.2000

For receiving Office use only

1. Date of actual receipt of the purported international application: 21 AVR. 2000 (21-04-2000)
2. Drawings: ☒ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority (if two or more are competent): ISA/
6. ☐ Transmittal of search copy delayed until search fee is paid.

For International Bureau use only

Date of receipt of the record copy by the International Bureau: 15 MAY 2000 (15.05.00)

FIG. 1

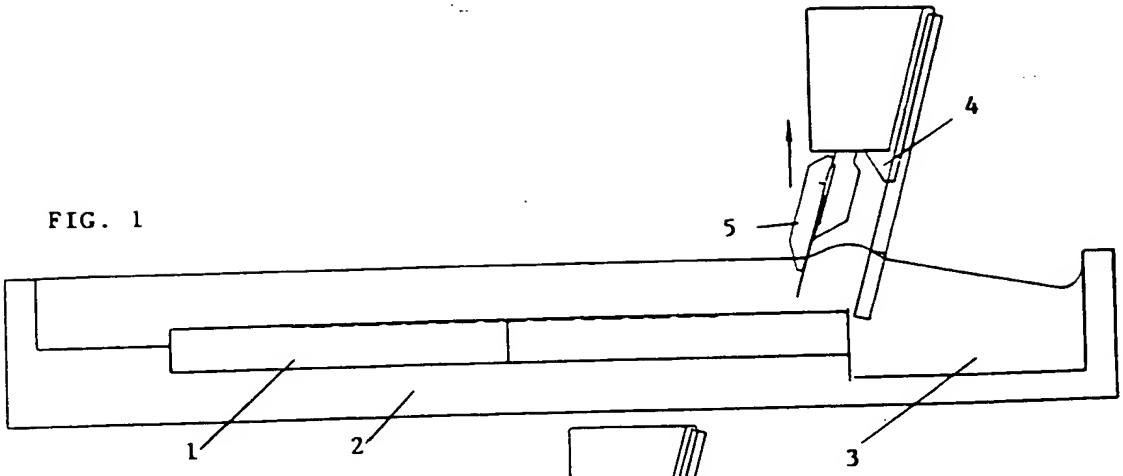


FIG. 2

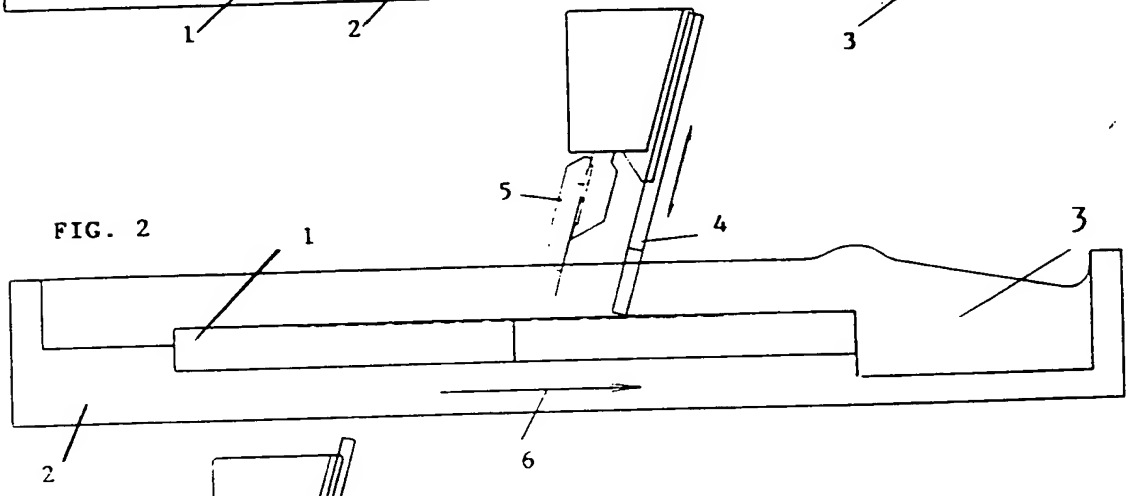


FIG. 3

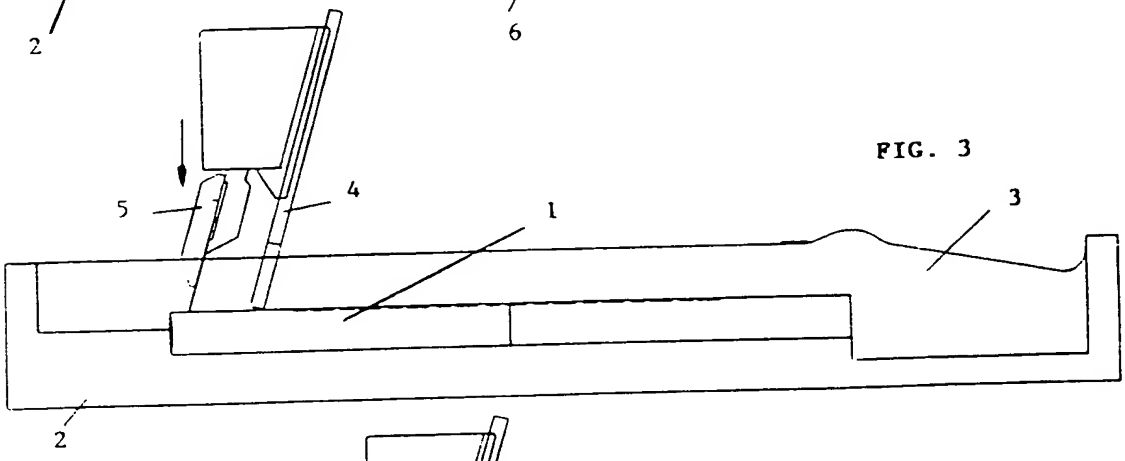
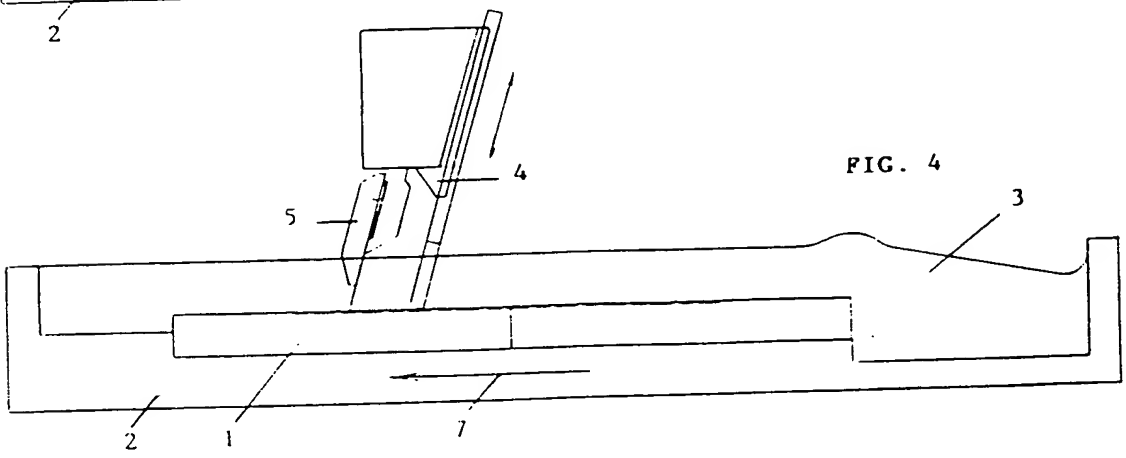


FIG. 4



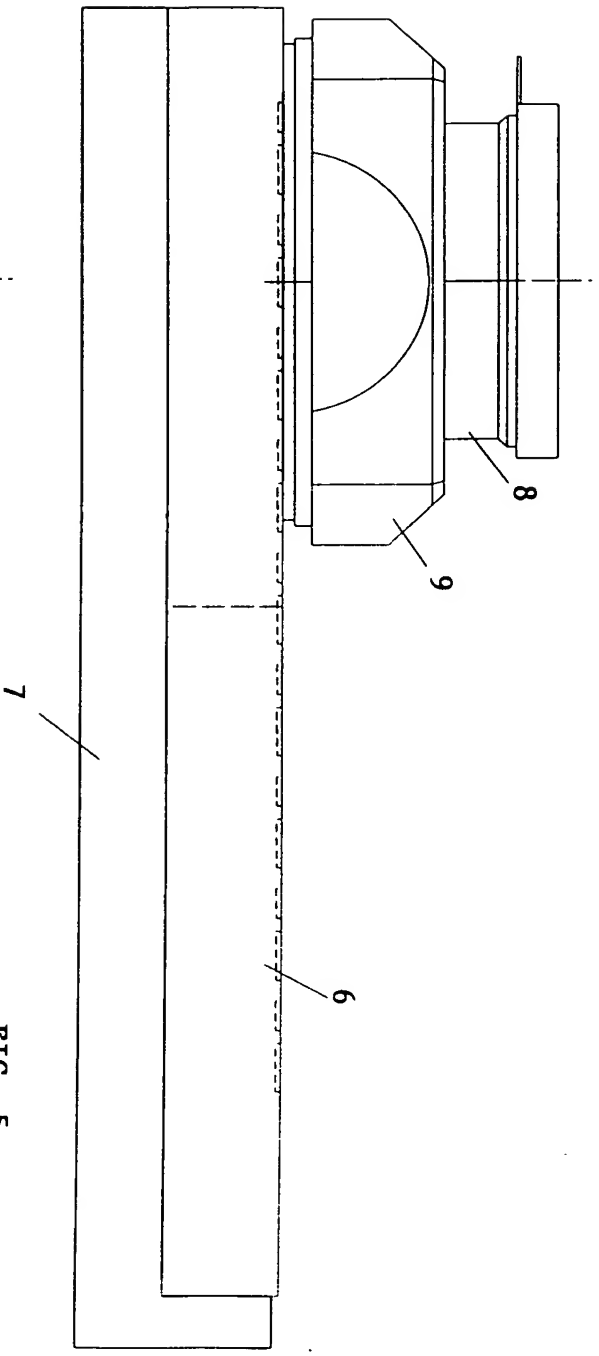


FIG. 5

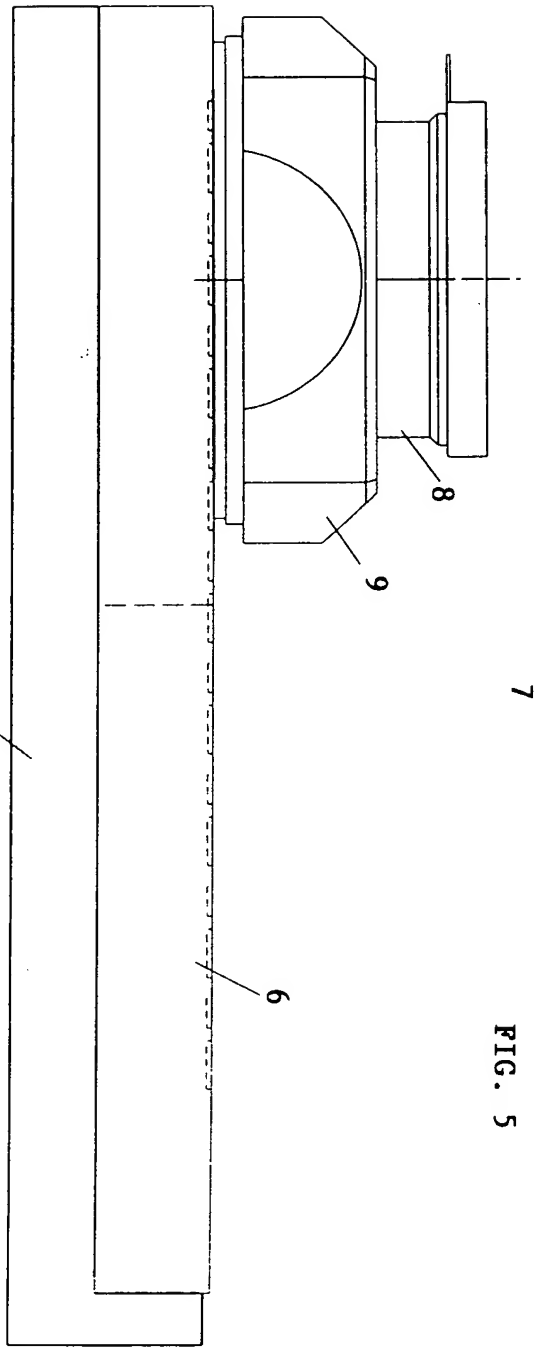


FIG. 6

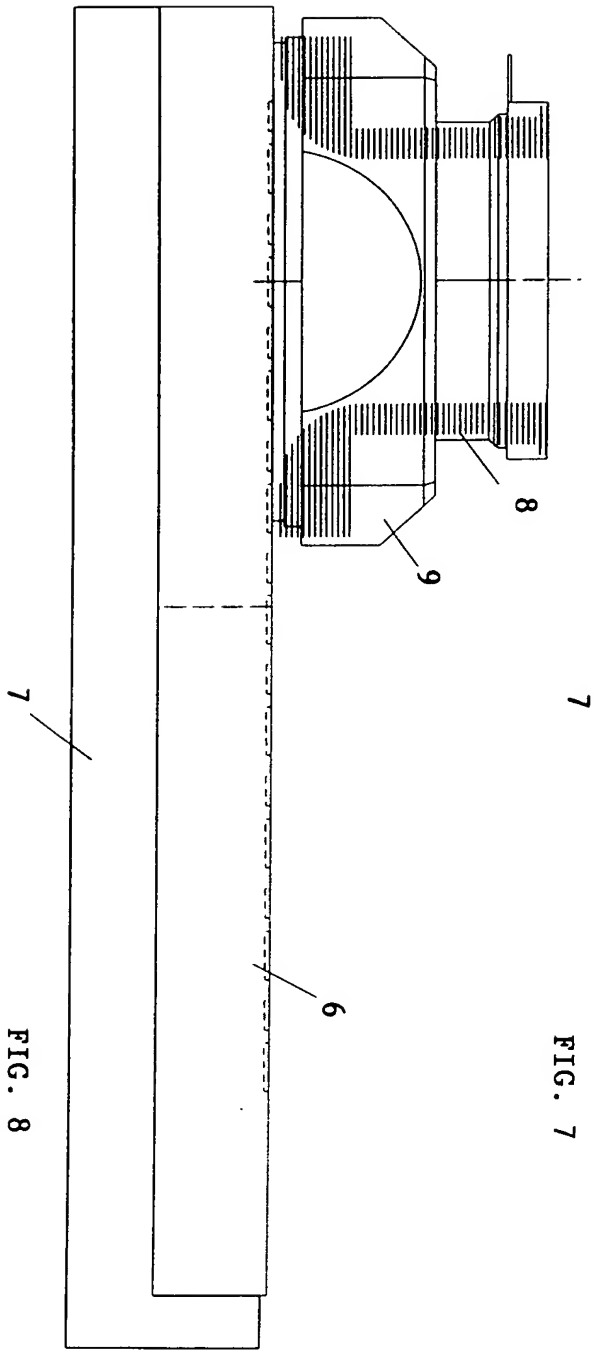


FIG. 8

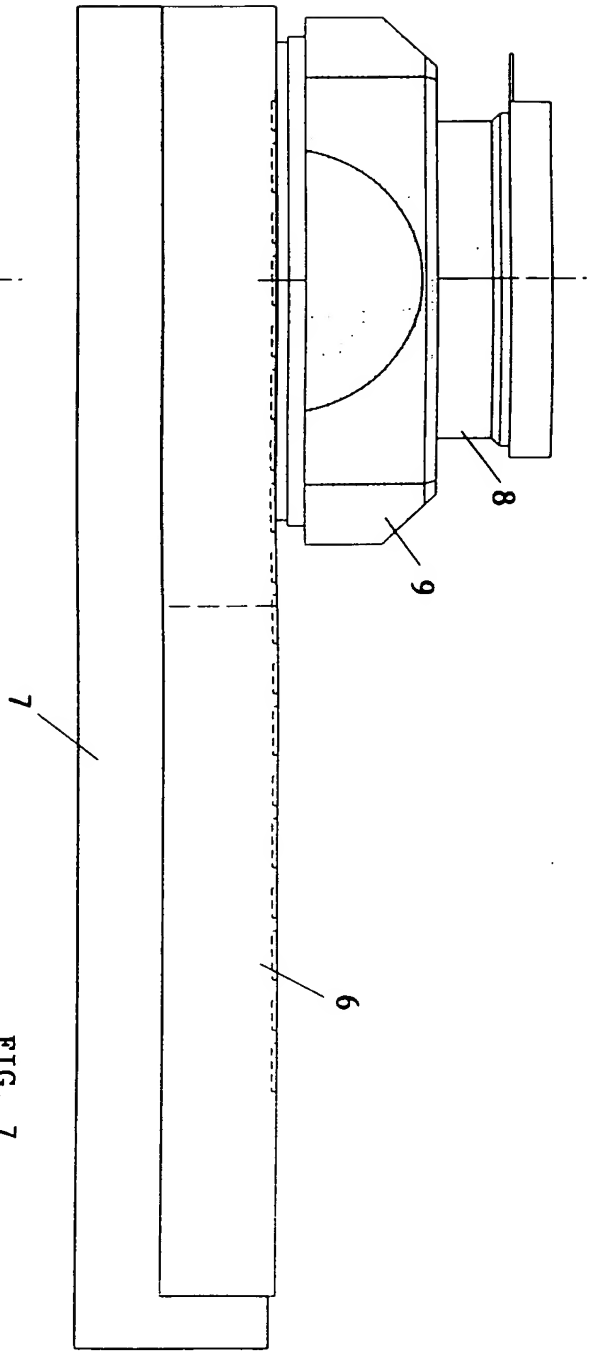


FIG. 7

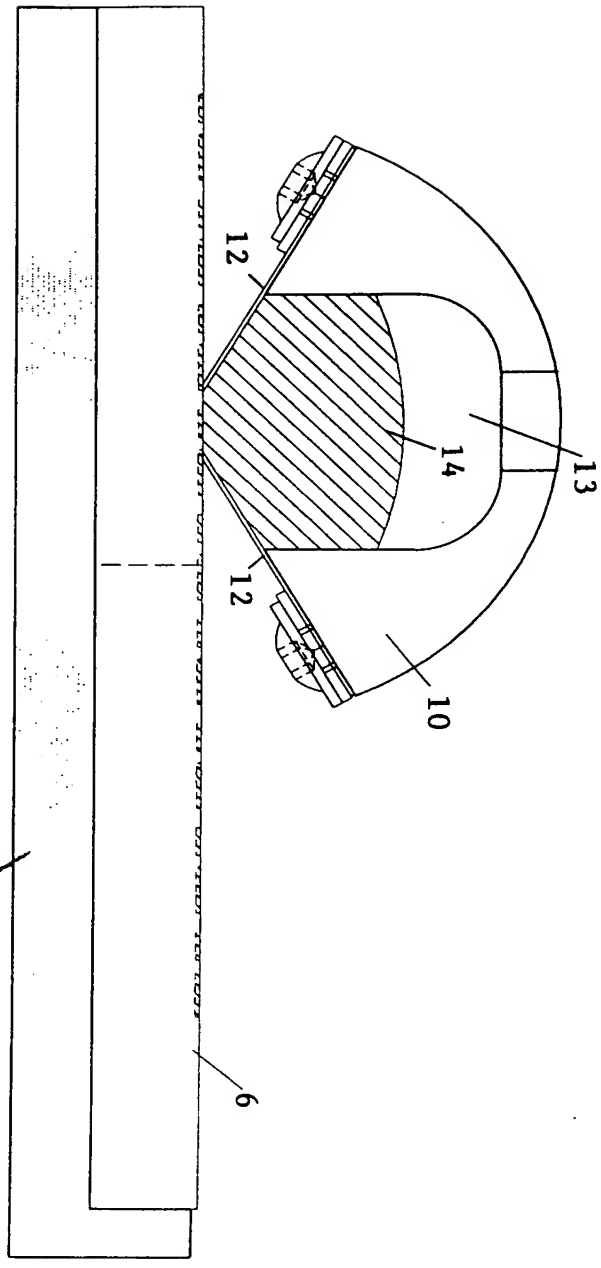


FIG. 9

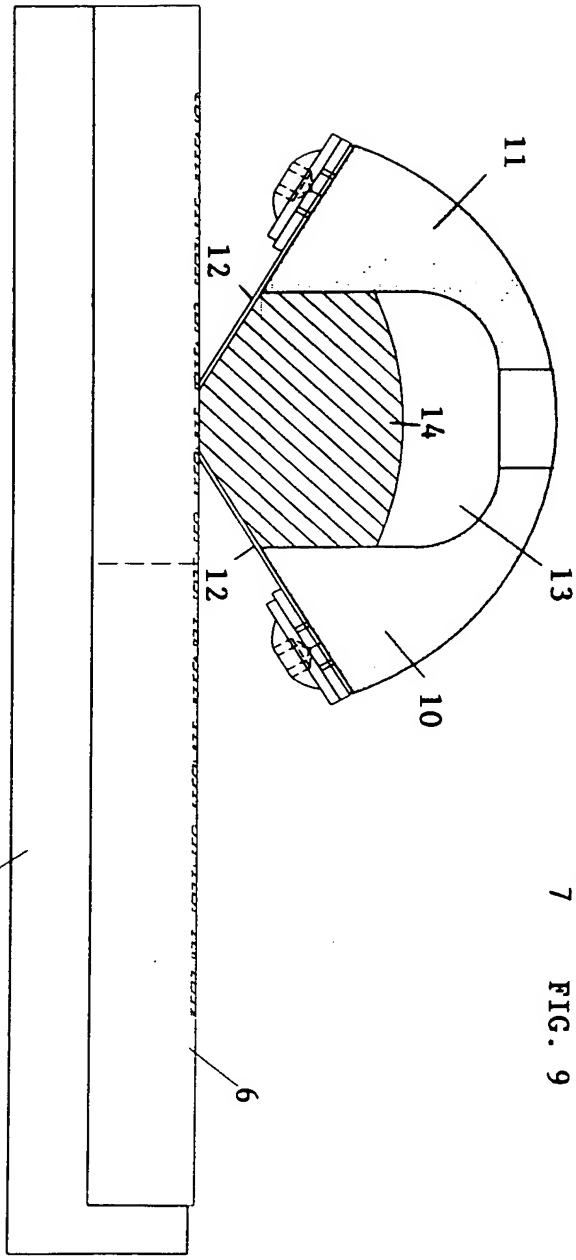


FIG. 10

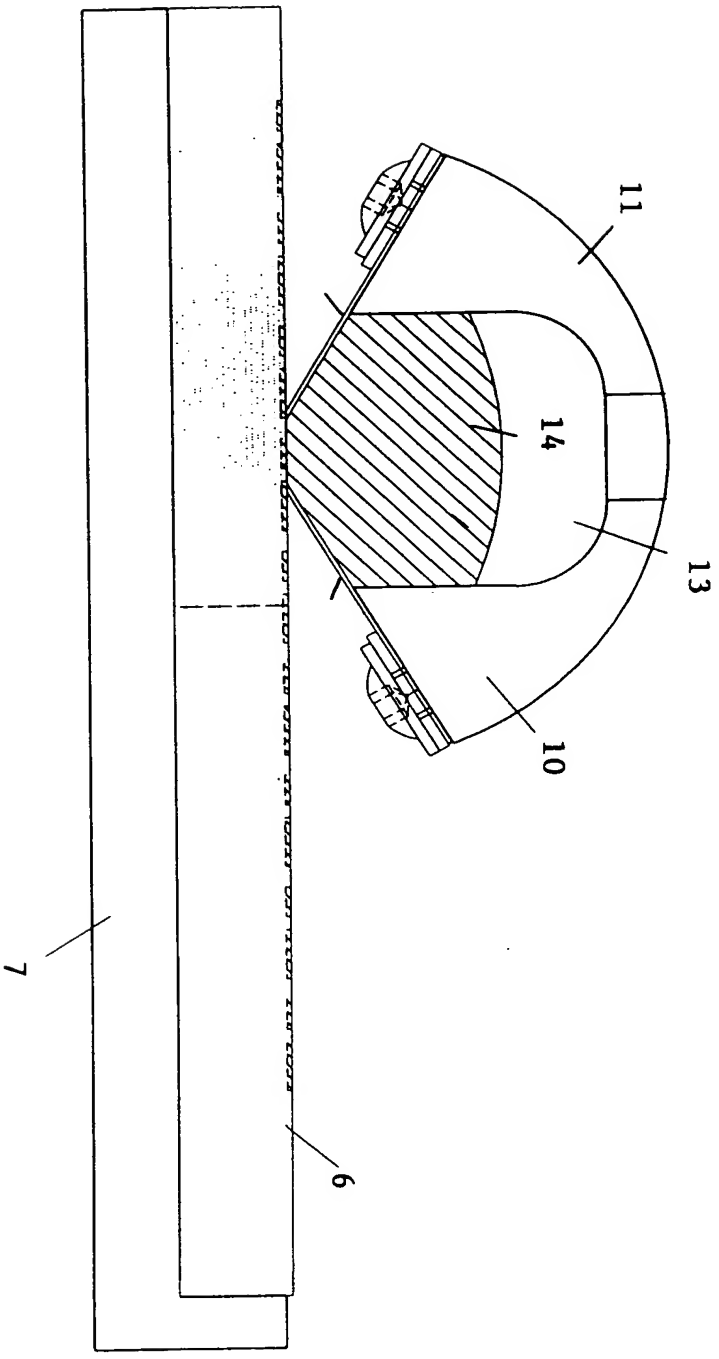


FIG. 11

Werkwijze voor het met thermoplastische inkten beïnkten van een cliché en hierbij te gebruiken inktreservoirs

Deze uitvinding heeft betrekking op een werkwijze voor het met een thermoplastische inkt beïnkten van een op een houder bevestigde clichéplaat, te gebruiken bij tampondrukken, waarbij een relatieve beweging wordt onderhouden tussen de houder en een met thermoplastische inkt gevuld inktreservoir.

Voor het bedrukken van substraten zoals glas, ceramiek en porselein wordt meestal een zogenaamde thermoplastische inkt gebruikt. Een dergelijke inkt heeft bij kamertemperatuur de viscositeit van een dikke pasta. Voor het bedrukken wordt deze inkt opgewarmd tot ongeveer 80°C, waarbij ze zeer vloeibaar wordt. Na het bedrukken zal de zeer vloeibare inkt op het bedrukken substraat naar kamertemperatuur afkoelen en dus weer stollen. De bedrukking op het substraat wordt permanent gemaakt door het bedrukte product gedurende een bepaalde tijd bij hoge temperatuur (rond de 800°C) te bakken. Hierdoor verglaast de inkt en smelt hij vast aan het substraat. Het resultaat is een zeer goed hechtende bedrukking die ook bij veelvuldig schoonmaken in de vaatwasser niet verbleekt of afgaat.

Zeefdruk is momenteel het courante procédé dat gebruikt wordt voor het bedrukken van glas met thermoplastische inkten om een aanvaardbare kwaliteit te bekomen.

In de bestaande zeefdruk techniek wordt gebruik gemaakt van een zeef die bestaat uit een kunststof of metaal maar moet weerstaan aan een temperatuur van maximum 100°C, die bevestigd is op een houten of metalen kader. De zeef is afgedekt met een niet doorlatende laag, behalve op de plaatsen waar inkt door de zeef moet kunnen om het te drukken beeld op het substraat te

vormen.

De pasteuze thermoplastische inkten worden op de zeef geplaatst. De zeef wordt opgewarmd zodat de thermoplastische inkt vloeibaar wordt.

Door middel van een rakel in kunststof of metaal wordt de thermoplastische inkt door de zeef gedrukt, alleen door de openingen die het beeld vertonen direct op het product: glas, ceramiek of porselein. Deze methode heeft de volgende beperkingen:

- beperkt in resolutie door het gebruik van een zeef waarvan de dichtheid van de draden die de zeef vormen fysisch beperkt is;
- kan alleen gebruikt worden voor het bedrukken van vlakke en cilindrische voorwerpen;
- sterke kwaliteitsvermindering van zodra het oppervlak van het te bedrukken voorwerp naar binnen of naar buiten gebogen is.

Naast zeefdruk kan ook beroep worden gedaan op de techniek die als "tampondrukken" bekend staat.

Tampondrukken met thermoplastische inktheeft tot nu toe weinig succes wegens geen betrouwbaarheid en geen constante kwaliteit.

In de techniek die bekend staat als "tampondrukken" wordt gebruik gemaakt van een gegraveerde clichéplaat die in een eerste stadium over de ganse oppervlakte wordt beïnkt waarna met een rakel de overtollige inkt wordt afgeschraapt en in een inktbak of dergelijke wordt opgevangen. De inkt blijft dus uitsluitend in de gegraveerde gedeeltes bewaard.

De verschillende bewerkingen die hiermee gepaard gaan, kunnen als volgt worden samengevat:

1) De rakelhouder met spatel wordt van de clichéplaat verwijderd en tijdens de beïnktingsfase op afstand van de clichéplaat gehouden.

2) De rakelhouder met spatel wordt tijdens de beïnktingsfase ten opzichte van de clichéplaat langszin hiervan verplaatst.

3) Na de beïnktingsfase wordt de rakel in contact gebracht met de clichéplaat.

4) De rakel wordt ten opzichte van de clichéplaat verplaatst; de inkt wordt, behalve in de gegraveerde gedeeltes, afgeschraapt en in een inktbak opgevangen.

Het is duidelijk dat de relatieve bewegingen van de rakelhouder met spatel ten opzichte van de clichéplaat het gevolg zijn zowel van een verplaatsing van deze onderdelen ten opzichte van een vaste clichéplaat als omgekeerd en dat dus zowel de clichéplaat als de rakel en de spatel in tegengestelde zin bewogen kunnen worden.

De rakel wordt steeds derwijze ten opzichte van de clichéplaat ingesteld dat hij met deze plaat een scherpe hoek vormt met het gedeelte van de clichéplaat dat beïnkt werd en nog moet afgeschraapt worden.

De algemeen toegepaste en in het kort omschreven technieken vertonen een reeks nadelen die als volgt kunnen worden samengevat:

a) De clichéplaat is aan een hoge slijtage onderworpen omwille van de druk door de rakel op de clichéplaat uitgeoefend. Een goede afschraping van de inkt is inderdaad een absolute vereiste, en dit vergt, bij opstelling van de rakel zoals hierboven bepaald, een hoge druk van de rakel op de clichéplaat.

b) Er zijn telkens twee bewegingen noodzakelijk die als volgt samengevat kunnen worden: op- of neergaande beweging van het rakelmes tijdens de relatieve bewegingen van de rakel ten opzichte van de clichéplaat.

Aangezien thermoplastische inkten gebruikt worden die op een constante gecontroleerde temperatuur moeten blijven, zijn er veel nadelen verbonden aan dit systeem. Deze worden hierna samengevat: - hevige slijtage van cliché en rakelmes door de noodzakelijke hoge druk van het rakelmes op de cliché, wat de drukkwaliteit sterk negatief beïnvloedt;

- problemen om de temperatuur constant te houden tijdens de op- en neergaande bewegingen van het rakelmes

die continu opgewarmd/afgekoeld worden en die een snelle "vervuiling" van verharde inkt op het rakelmes veroorzaken.

De combinatie van bovenstaande nadelen zorgt ervoor dat een productie met constante drukkwaliteit vrijwel onmogelijk te realiseren is.

De uitvinding heeft tot doel de nadelen van deze bekende technieken te verhelpen en een werkwijze en een inrichting voor te schrijven die met technisch betrouwbare middelen een hogere levensduur van de clichéplaat verzekeren en een betrouwbaar gebruik van thermoplastische inkten mogelijk maakt.

Om dit conform de uitvinding mogelijk te maken, verwarmt men de houder of het inktreservoir, of deze beide onderdelen, op de voor de thermoplastische inkt vereiste temperatuur.

In een eerste mogelijke uitvoeringsvorm maakt men als inktreservoir gebruik van een elektrisch verwarmd inktreservoir met cirkelvormige of ovaalvormige rakel uit een hard materiaal, zoals hard metaal of kunststof in de vorm van een monolitish onderdeel uit niet vervormbaar materiaal waarin aan de omtrek een cirkelvormig of ovaalvormig kanaal is uitgespaard voor het zowel door klikken bevestigen van hogerbedoelde rakel als het aan dit onderdeel door verlijming bevestigen van bedoelde rakel.

Volgens een andere mogelijke uitvoeringsvorm maakt men gebruik van een inrichting bestaande uit de combinatie van een verwarmd inktreservoir met minstens één rakel, waarvan minstens de onderste rand die in contact komt met de clichéplaat, ten opzichte van de clichéplaat onder een negatieve hoek gemeten ten opzichte van het beïnkt en af te schrapen gedeelte van de clichéplaat is ingesteld en men, zonder de stand van de rakel te wijzigen, een relatieve beweging van de rakel ten opzichte van de clichéplaat verwekt, enerzijds in een richting om de clichéplaat te beïnkten en, anderzijds, in de andere richting om de inkt van de clichéplaat af te schrapen.

De uitvinding heeft eveneens betrekking op gesloten inktreservoirs te gebruiken in het raam van de uitvinding.

Andere details en voordelen van de uitvinding zullen blijken uit de werkwijze voor het met een thermoplastische inkt beïnkten van een op een houder bevestigde clichéplaat of zeer en hierbij gebruikt inktreservoir, volgens de uitvinding. De verwijzingscijfers hebben betrekking op de hieraan toegevoegde figuren.

Figuren 1 tot 4 illustreren schematisch een klassieke tampondrukwerkwijze.

Figuur 5 vertoont schematisch een gesloten inktreservoir met verwarmde clichéhouder.

Figuur 6 vertoont schematisch een gesloten inktreservoir met verwarmd cliché.

Figuur 7 vertoont schematisch een gesloten inktreservoir met verwarmde houder.

Figuur 8 vertoont schematisch een gesloten inktreservoir met verwarmd inktreservoir.

Figuur 9 vertoont schematisch een gesloten rakelkamer met verwarmde clichéhouder.

Figuur 10 vertoont schematisch een gesloten rakelkamer met verwarmd cliché.

Figuur 11 vertoont schematisch een gesloten en verwarmde rakelkamer.

De werkwijze door de figuren 1 tot 4 voorgesteld illustreert op een schematische doch duidelijke wijze de verschillende stappen van de beïnkting in de tampondruktechniek. Met 1 wordt verwezen naar de clichéplaat 2 die in een houder 2' is bevestigd, waarvan het uitgediepte gedeelte de inktkamer 3 vormt waarin de inkt, na het afschrapen van de clichéplaat 1 wordt opgevangen. In principe bevat een inrichting voor het beïnkten van een clichéplaat steeds een spatel 4 en een rakel 5. Deze onderdelen worden afzonderlijk op en neer bewogen door toepassing van middelen die hier niet in detail zullen worden beschreven.

Het is duidelijk dat de relatieve bewegingen van de rakelhouder met spatel ten opzichte van de clichéplaat het gevolg zijn zowel van een verplaatsing van deze onderdelen ten opzichte van

een vaste clichéplaat als omgekeerd en dat dus zowel de clichéplaat als de rakel en de spatel in tegengestelde zin bewogen kunnen worden.

De algemeen toepaste en in het kort omschreven technieken vertonen een reeks nadelen die als volgt kunnen worden samengevat:

a) De rakel wordt steeds derwijze ten opzichte van de clichéplaat ingesteld dat hij met deze plaat een scherpe hoek vormt met het gedeelte van de clichéplaat dat beïnkt werd en nog moet afgeschraapt worden;

b) De clichéplaat is aan een hoge slijtage onderworpen omwille van de druk door de rakel op de clichéplaat uitgeoefend. Een goede afschraping van de inkt is inderdaad een absolute vereiste, en dit vergt, bij opstelling van de rakel zoals onder a) bepaald, een hoge druk van de rakel op de clichéplaat.

c) Er zijn telkens twee bewegingen noodzakelijk die als volgt samengevat kunnen worden: op- of neergaande beweging van het rakelmes tijdens de relatieve bewegingen van de rakel ten opzichte van de clichéplaat.

Aangezien thermoplastische inkten op een constante gecontroleerde temperatuur moeten blijven, zijn er veel nadelen verbonden aan de zopas beschreven werkwijze. Deze nadelen zijn onder meer:

- hevige slijtage van cliché en rakelmes door de noodzakelijke hoge druk van het rakelmes op de cliché, wat de drukkwaliteit sterk negatief beïnvloedt;
- moeilijk om de temperatuur constant te houden, op- en neergaande bewegingen van het rakelmes die continu opgewarmd/afgekoeld worden en die een snelle "vervuiling" van verharde inkt op het rakelmes veroorzaken.

De combinatie van bovenstaande nadelen zorgt ervoor dat een productie met constante drukkwaliteit vrijwel onmogelijk te realiseren is.

Volgens de uitvinding wordt nu, omwille van het gebruik van thermoplastische inkten, gebruik gemaakt van een

verwarmde houder voor de cliché 4 op een gesloten verwarmd inktreservoir, maar het zal onmiddellijk duidelijk zijn dat deze beide onderdelen verwarmd zouden kunnen worden.

De verschillende uitvoeringsvormen van de werkwijze en van de hierbij te gebruiken houders of inktreservoirs, zullen hierna worden besproken.

In de uitvoeringsvorm volgens figuur 5 wordt gebruik gemaakt van een clichéplaat 6 die vastzit in de clichéhouder 7. Met 8 wordt verwezen naar een inktkamer met houder 9. In deze uitvoeringsvorm wordt dus alleen de clichéhouder 7 verwarmd.

Figuur 6 betreft een variante van de uitvinding volgens dewelke de clichéplaat 6 wordt verwarmd terwijl noch de clichéhouder 7, noch de inktkamer 8 worden verwarmd. Zoals reeds eerder is gezegd, is een combinatie van de beide zopas beschreven uitvoeringsvormen denkbaar.

In de uitvoeringsvorm volgens figuur 7 wordt uitsluitend de inktkamerhouder 9 verwarmd terwijl volgens figuur 8 de inktkamer 8 alleen verwarmd wordt. In de geest van de uitvinding kunnen de uitvoeringsvormen volgens figuur 5-8 onder elkaar worden gecombineerd.

De gesloten kamers 10 volgens figuren 9-11 hebben betrekking op een zeer merkwaardige uitvoeringsvorm van de bij deze aanvraag te gebruiken inktkamer. De gesloten inktkamers worden hier gecombineerd volgens de hierna beschreven uitvoeringsvorm, t.w.

a) (Fig. 9) Hier wordt de inktkamer 10 gebruikt in combinatie met een verwarmde clichéhouder 7;
b) (Fig. 10) Hier wordt uitsluitend de clichéplaat 6 verwarmd;
c) (Fig. 11) In deze uitvoeringsvorm wordt uitsluitend de inktkamer 10 verwarmd.

In de geest van de uitvinding kunnen de uitvoeringsvormen volgens figuren 9 - 11 onder elkaar worden gecombineerd.

De inktkamer 10 is een bijzonder aantrekkelijke uitvoeringsvorm. Hij bestaat uit een behuizing 11 die, in combinatie

met twee rakels 12, een volledige gesloten inktkamer 13 vormt.

De in de inktkamer aanwezige inkt (14) wordt tegelijkertijd door de beide rakels 8 op de clichéplaat uitgestreken en hiervan afgestreken.

Door de bijzondere hoek onder dewelke de rakels 8 ten opzichte van de clichéplaat 6 zijn ingesteld, wordt een voor het gebruik van thermoplastische inkten bijzonder voordelige "inktspleet" van de gesloten inktkamer verwezenlijkt.

De toepassing van een gesloten inktkamer van het door de figuren 9, 10 en 11 geïllustreerd type creëert een ideale toestand met het gebruik van thermoplastische inkten.

De opvallende voordelen van de werkwijze volgens de uitvinding en van de hierbij gebruikte gesloten inktkamers kunnen als volgt worden samengevat:

a) Aangezien er geen op- en neergaande bewegingen zijn van zowel gesloten inktkamer als van het rakelkamermechanisme is er hiervan geen afkoeling mogelijk.

b) De beperkte gebruikte hoeveelheid thermoplastische inkt die volgens de werkwijze zullen worden gebruikt, maakt het behouden van een constante temperatuur eenvoudiger.

c) Minimum slijtage van cliché doordat de druk van rakelkamer of inktpot op de cliché laag is.

d) Cliché en inkt zijn gemakkelijk om te wisselen met zeer korte omwisseltijden.

e) Een zuinig inktgebruik doordat de inkt verliezen bij het schoonmaken zeer klein zijn.

f) Door de beperkte gebruikte hoeveelheid thermoplastische inkt en de afwezigheid van een inktbak is de machine sneller op bedrijfstemperatuur na het aanzetten wanneer bij kamertemperatuur gestart wordt.

CONCLUSIES

1. Werkwijze voor het met een thermoplastische inkt beïnkten van een op een houder bevestigde clichéplaat, te gebruiken bij tampondrukken, waarbij een relatieve beweging wordt onderhouden tussen de houder en een met thermoplastische inkt gevuld inktreservoir, met het kenmerk dat men de houder of het inktreservoir, of deze beide onderdelen, op de voor de thermoplastische inkt vereiste temperatuur verwarmt.

2. Werkwijze volgens conclusie 1, met het kenmerk dat men als inktreservoir gebruik maakt van een verwarmd inktreservoir met cirkelvormige of ovaalvormige rakel uit een hard materiaal, zoals hard metaal of kunststof in de vorm van een monolitish onderdeel uit niet vervormbaar materiaal waarin aan de omtrek een cirkelvormig of ovaalvormig kanaal is uitgespaard voor het zowel door klikken bevestigen van hogerbedoelde rakel als het aan dit onderdeel door verlijming bevestigen van bedoelde rakel.

3. Werkwijze volgens conclusie 1, met het kenmerk dat men als inktreservoir gebruik maakt van een inrichting bestaande uit de combinatie van een verwarmd inktreservoir met minstens een rakel, waarvan minstens de onderste rand die in contact komt met de clichéplaat, ten opzichte van de clichéplaat onder een negatieve hoek gemeten ten opzichte van het beïnkt en af te schrapen gedeelte van de clichéplaat is ingesteld en men, zonder de stand van de rakel te wijzigen, een relatieve beweging van de rakel ten opzichte van de clichéplaat verwekt, enerzijds in een richting om de clichéplaat te beïnkten en, anderzijds, in de andere richting om de inkt van de clichéplaat af te schrapen.

4. Inktreservoir te gebruiken bij de toepassing van de werkwijze volgens conclusie 2, met het kenmerk dat hij is verwezenlijkt in de vorm van een monolitish onderdeel uit niet vervormbaar materiaal waarin aan de omtrek een cirkelvormig of ovaalvormig kanaal is uitgespaard voor het zowel door klikken bevestigen van hogerbedoelde rakel als het aan dit onderdeel door verlijming bevestigen van bedoelde rakel.

5. Inktreservoir volgens conclusie 4, met het kenmerk dat hogerbedoeld hard materiaal een synthetische stof is.

6. Inktreservoir volgens conclusie 5, met het kenmerk dat bedoelde synthetische stof een polyacetaal is.

7. Inktreservoir volgens één van de conclusies 5 en 6, met het kenmerk dat hogerbedoelde rakel uit hogerbedoelde synthetische stof door een kleefmiddel werd verbonden.

8. Inktreservoir volgens conclusie 4, met het kenmerk dat hogerbedoelde rakel uit hogerbedoelde synthetische stof door een snap- of klikbewerking met het monolitisch onderdeel werd verbonden.

9. Inktreservoir volgens één van de conclusies 5 - 5, met het kenmerk dat hogerbedoelde rakel tijdens het spuiten of gieten van hogerbedoelde synthetische stof waaruit hogerbedoeld inktreservoir bestaat hiermede werd verbonden.

10. Verwarmd inktreservoir voor het uitvoeren van de werkwijze volgens conclusie 3, met het kenmerk dat hij bestaat uit de combinatie van

a) een inktreservoir voor het tijdens een relatieve beweging van de clichéplaat ten opzichte van dit inktreservoir beïnkten van de clichéplaat en van

b) minstens een rakel waarvan de onderste rand die in contact komt met de clichéplaat, onder een negatieve hoek ten opzichte van de clichéplaat is ingesteld, waarmede een hoek wordt bedoeld gemeten ten opzichte van het gedeelte van de clichéplaat die beïnkt werd en nog afgeschraapt moet worden.

11. Inktreservoir volgens conclusie 10, met het kenmerk dat hogerbedoelde rakel is ingesteld onder een negatieve hoek gelegen tussen nagenoeg 90 en nagenoeg 180°.

12. Inktreservoir volgens één van de conclusies 10 en 11, met het kenmerk hij langwerpig is en met hogerbedoelde rakel een langwerpige inktspleet vormt.

13. Inktreservoir volgens conclusie 12, met het kenmerk dat hogerbedoelde rakel en het inktreservoir op een gemeenschappelijke langwerpige behuizing zijn gemonteerd.

14. Inktreservoir volgens conclusie 13, met het kenmerk dat hogerbedoelde rakel en hogerbedoelde langwerpige behuizing een geheel vormen.

15. Inktreservoir volgens één van de conclusies 10 - 14, met het kenmerk dat twee rakels tegenover elkaar zijn opgesteld.

16. Inktreservoir volgens één van de conclusies 10-15, met het kenmerk dat hogerbedoelde rakel een gesloten kring vormt en een gedeelte van de rakel volgens hogerbedoelde negatieve hoek verloopt.

17. Inktreservoir volgens één van de conclusies 13-16, met het kenmerk dat in hogerbedoelde behuizing een verwarmingsweerstand is gemonteerd.

UITTREKSEL

Werkwijze voor het met thermoplastische inkten beïnkten van een cliché en hierbij te gebruiken inktreservoirs

De uitvinding betreft een werkwijze voor het met een thermoplastische inkt beïnkten van een op een houder bevestigde clichéplaat, te gebruiken bij tampondrukken, waarbij een relatieve beweging wordt onderhouden tussen de houder en een met thermoplastische inkt gevuld inktreservoir, gekenmerkt doordat men de houder of het inktreservoir, of deze beide onderdelen, op de voor de thermoplastische inkt vereiste temperatuur verwarmt. De uitvinding heeft eveneens betrekking op de bij deze werkwijze te gebruiken inktreservoirs.

Figuur 7.

Copy for the Elected Office (EO/US)

PCT/BE00/00044

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

VAN CUTSEM, Paul
Avenue Winston Churchill 152/6
B-1180 Bruxelles
BELGIQUE

Date of mailing (day/month/year)
19 October 2001 (19.10.01)

Applicant's or agent's file reference
7023GD1/PV

IMPORTANT NOTIFICATION

International application No.
PCT/BE00/00044

International filing date (day/month/year)
21 April 2000 (21.04.00)

1. The following indications appeared on record concerning:

[X] the applicant [ ] the inventor [ ] the agent [ ] the common representative

Name and Address
PRINTING INTERNATIONAL
Industriepark
Ambachtenlaan 12
B-9880 Aalter
Belgium

State of Nationality: BE
State of Residence: BE
Telephone No.:
Facsimile No.:
Teleprinter No.:

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[X] the person [ ] the name [ ] the address [ ] the nationality [ ] the residence

Name and Address
DE VOLDER, Laurent
Alterstraat 11
B-9880 Aalter
Belgium

State of Nationality: BE
State of Residence: BE
Telephone No.:
Facsimile No.:
Teleprinter No.:

3. Further observations, if necessary:
The applicant in box 1 has assigned his rights to the applicant/inventor in box 2, who is now the sole applicant for all designated States.

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[ ] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer
Ingrid AULICH

Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994)

004385545

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 12 December 2000 (12.12.00)	
International application No. PCT/BE00/00044	**Applicant's or agent's file reference** 7023GD1/PV
International filing date (day/month/year) 21 April 2000 (21.04.00)	**Priority date** (day/month/year) 29 April 1999 (29.04.99)
Applicant DE VOLDER, Laurent	

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   18 November 2000 (18.11.00)

   [ ] in a notice effecting later election filed with the International Bureau on:

   _____

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Olivia TEFY
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : B41F 17/00

A1

(11) International Publication Number: WO 00/66363

(43) International Publication Date: 9 November 2000 (09.11.00)

(21) International Application Number: PCT/BE00/00044

(22) International Filing Date: 21 April 2000 (21.04.00)

(30) Priority Data:
99870075.1 29 April 1999 (29.04.99) EP

(71) Applicant *(for all designated States except US)*: PRINTING INTERNATIONAL [BE/BE]; Industriepark, Ambachtenlaan 12, B–9880 Aalter (BE).

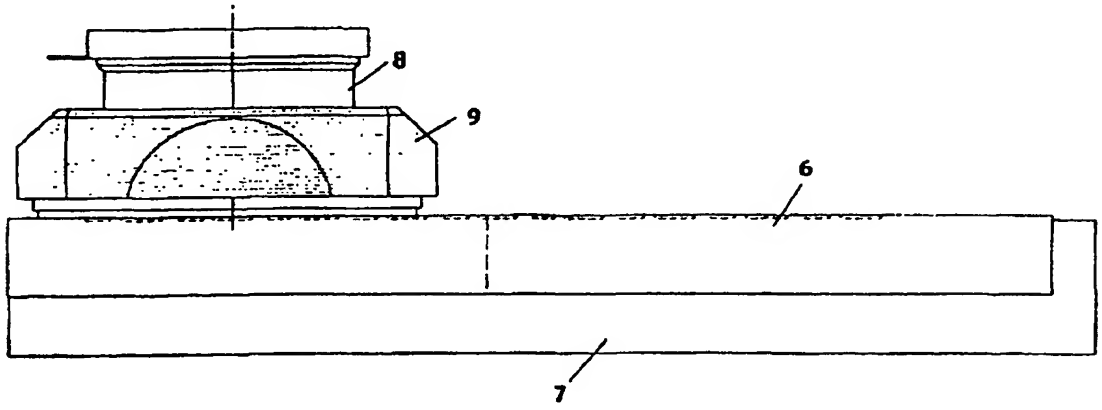
(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: DE VOLDER, Laurent [BE/BE]; Alterstraat 11, B–9880 Aalter (BE).

(74) Agent: VAN CUTSEM, Paul; Avenue Winston Churchill 152/6, B–1180 Bruxelles (BE).

(81) Designated States: AE, AG, AL, AM, AT, AU, BA, BB, BG, BR, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, US, UZ, VN, YU, ZA, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.
In English translation (filed in Dutch).

(54) Title: PROCESS FOR INKING A PRINTING PLATE WITH THERMOPLASTIC INKS AND INK TANKS TO BE USED THEREIN



(57) Abstract

The invention relates to a process for inking a printing plate attached to a holder, with a thermoplastic ink, to be used in pad printing, whereby a relative movement is maintained between the holder and an ink tank filled with thermoplastic ink, characterised in that the holder or the ink tank, or both these components are heated at the temperature required for the thermoplastic ink. The invention also relates to the ink tanks to be used in this process.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

Process for inking a printing plate with thermoplastic inks and ink tanks to be used therein

This invention relates to a process for inking a printing plate attached to a holder, with a thermoplastic ink, to be used in pad printing, wherein a relative movement is maintained between the holder and an ink tank filled with thermoplastic ink.

For the printing of substrates such as glass, ceramics and china, mostly a so-called thermoplastic ink is used. Such an ink has the viscosity of a thick paste at room temperature. For printing, this ink is heated to about 80°C, whereby it becomes very fluid. After printing, the very fluid ink on the printed substrate cools down to room temperature and consequently coagulates again. The print on the substrate is fixed by baking the printed product for a certain time at high temperature (around 800°C). By doing so, the ink vitrifies and fuses to the substrate. The result is a strongly adhesive print that does not fade or wear off, even when frequently cleaned in the dishwasher.

Silkscreen printing is at present the current process used for printing glass with thermoplastic inks to obtain an acceptable quality.

In the existing silksceen technique, a screen is used that is comprised of a plastic material or metal, but must resist to a temperature of maximum 100°C, and that is attached to a wooden or metallic frame. The screen is covered with an impermeable layer, except in the spots where ink must be able to pass the screen to form the image to be printed on the substrate.

The pasty thermoplastic inks are placed on the screen. The screen is heated, so that the thermoplastic ink becomes fluid.

By means of a doctor blade of plastic material or metal, the thermoplastic ink is pushed through the screen, only through the openings that show the image directly on the product: glass, ceramics or china. This method has the following limitations:

- limited in resolution by the use of a screen, of which the density of the threads forming the screen is physically limited;
- can only be used for printing flat and cylindrical objects;
- quality is sharply reduced as soon as the surface of the object to be printed is bent inside or outside.

Apart from silkscreen printing, also the technique known as pad printing may be used.

Pad printing with thermoplastic ink has known little succes up to now, because of lack of reliability and lack of constant quality.

In the technique which is known as "pad printing", an engraved printing plate is used, which in a first stage is inked over its entire surface, whereupon with a doctor blade the excess ink is scraped off, and collected in an ink duct or the like. The ink thus exclusively remains in the engraved parts.

The different operations involved in this, may be summarized as follows:

1) The doctor blade holder with slab is removed from the printing plate and is kept at a distance from the printing plate during the inking stage.

2) The doctor blade holder with slab is moved with respect to the printing plate during the inking stage, in the longitudinal direction thereof.

3) After the inking stage, the doctor blade is brought into contact with the printing plate.

4) The doctor blade is moved with respect to the printing plate; the ink is scraped off, except in the engraved portions, and is collected in an ink tank.

It is clear that the relative movements of the doctor blade holder with slab, with respect to the printing plate, are the result from both a moving of these parts with respect to a stationary printing plate, and the reverse, and that consequently both the printing plate and the doctor blade and the slab can be moved in opposite sense.

The doctor blade is always adjusted in such a way with respect to the printing plate, that it forms a sharp angle with this plate, with the portion of the printing plate that has been inked and must yet be scraped off.

The techniques which are generally applied and briefly described, show a series of disadvantages which can be summarized as follows:

a) The printing plate is subjected to high wear, because of the pressure exerted by the doctor blade on the printing plate. A good scraping off of the ink is indeed an absolute requirement, and this requires, at the installation of the doctor blade as described above, a high pressure of the doctor blade on the printing plate.

b) Each time, two movements are required, which can be summarized as follows: up or down movement of the doctor blade knife during the relative movements of the doctor blade with respect to the printing plate.

Since thermoplastic inks are used, which must be held at a constant, controlled temperature, many disadvantages are associated to this system. These are summarized hereafter:

- severe wear of the printing plate and doctor blade knife because of the required high pressure of the doctor blade knife on the printing plate, which strongly affects the print quality in a negative way.

- problems to keep the temperature at a constant level during the up and down movements of the doctor blade knife, which is continuously heated and cooled, as a result of which the doctor blade knife is rapidly "polluted" by hardened ink.

The combination of above disadvantages is the reason why a production with a constant print quality is almost impossibly feasible.

It is the aim of the invention to remediate the disadvantages of this known technique, and to prescribe a process and a device ensuring with technically reliable means, an increased life of the printing plate and enabling a reliable use of thermoplastic inks.

In order to make this possible according to the invention, the holder or the ink tank, or both these components, are heated to the temperature required for the thermoplastic ink.

In a first possible embodiment, as an ink tank, an electrically heated ink tank is used, with circular or oval doctor blade of a hard material, such as hard metal or plastic material in the shape of a monolithic component of undeformable material, in which, at the periphery a circular or oval canal is made for attaching above said doctor blade by snap connection, as well as for attaching above said doctor blade to this component by glueing.

According to another possible embodiment, a device is used consisting of a combination of a heated ink tank and at least one doctor blade, of which at least the bottom edge which is contacting the printing plate, is adjusted with respect to the printing plate at a negative angle, measured with respect to the inked portion of the printing plate to be scraped off, and without changing the position of the doctor blade, a relative movement of the doctor blade with respect to the printing plate is generated, on the one hand, in a direction to ink the printing plate, and on the other hand, in the other direction, to scrape off the ink from the printing plate.

The invention also relates to closed ink tanks to be used within the frame of the invention.

Other details and advantages of the invention will show from the process for inking a printing plate attached to a holder, with thermoplastic ink and the ink tank used herein according to the invention. The reference numbers refer to the attached figures.

Figures 1 to 4 schematically illustrate a classical pad printing process.

Figure 5 schematically shows a closed ink tank with heated printing plate holder.

Figure 6 schematically shows a closed ink tank with heated printing plate.

Figure 7 schematically shows a closed ink tank with heated holder.

Figure 8 schematically shows a closed ink tank with heated ink tank.

Figure 9 schematically shows a closed doctor blade chamber with heated printing plate holder.

Figure 10 schematically shows a closed doctor blade chamber with heated printing plate.

Figure 11 schematically shows a closed and heated doctor blade chamber.

The process shown by figures 1-4 schematically, but clearly illustrates the different steps of inking in the pad printing technique.

1 refers to the printing plate which is fixed in a holder 2, the deepened part of which forms the ink chamber 3, in which the ink is collected after the scraping off of the printing plate 1. In principle, a device for inking a printing plate always comprises an ink slab 4 and a doctor blade 5. These components are separately moved up and down by means which will not be described in detail here.

It is clear that the relative movements of the doctor blade holder with slab, with respect to the printing plate, are the result of both a movement of these components with respect to a stationary printing plate, and the reverse, and consequently that both the printing plate and the doctor blade with slab can be moved in opposite sense.

The techniques generally applied and briefly described show a series of disadvantages which can be summarized as follows:

a) The doctor blade is always adjusted in such a way with respect to the printing plate, that it forms a sharp angle with this plate, with the portion of the printing plate that has been inked and must yet be scraped off.

b) The printing plate is subjected to high wear, because of the pressure exerted by the doctor blade on the printing plate. A good scraping off of the

ink is indeed an absolute requirement, and this requires, at the installation of the doctor blade as described sub a), a high pressure of the doctor blade on the printing plate.

c) Each time, two movements are required, which can be summarized as follows: up or down movement of the doctor blade knife during the relative movements of the doctor blade with respect to the printing plate.

Since thermoplastic inks should be held at a constant controlled temperature, many disadvantages are connected to the process just described. These disadvantage are, i.a.

- severe wear of printing plate and doctor blade knife because of the required high pressure of the doctor blade knife on the printing plate, which strongly affects the print quality in a negative way.
- problems to keep the temperature at a constant level during the up and down movements of the doctor blade knife, which is continuously heated and cooled, as a result of which the doctor blade knife is rapidly "polluted" by hardened ink.

The combination of above disadvantages is the reason why a production with a constant print quality is almost impossibly feasible.

According to the invention now, because of the use of thermoplastic inks, a heated printing plate holder 4 or a closed, heated ink tank is used, but it will immediately be obvious that both these components could be heated.

The different embodiments of the process and the holders or ink tanks to be used herein, will be discussed hereafter.

In the embodiment according to figure 5, a printing plate 6 is used that is fixed into the printing plate holder 7. With 8, reference is made to an inking chamber with holder 9. So in this embodiment, only the printing plate holder 7 is heated.

Figure 6 concerns an alternative of the invention according to which the printing plate 6 is heated, whereas neither the printing plate holder 7, nor the inking chamber 8 are heated. As has been said before, a combination of the embodiments described just now, is conceivable.

In the embodiment according to figure 7, exclusively the inking chamber holder 9 is heated, whereas according to figure 8, only the inking chamber 8 is heated. In the spirit of the invention, the embodiments according to figures 5-8 can be both mutually combined.

The closed chambers 10 according to figures 9-11 relate to a very remarkable embodiment of the inking chamber to be used with this application. The closed inking chambers are combined here according to the embodiment described hereafter; i.e.

a) (Fig. 9) Here the inking chamber 10 is used in combination with a heated printing plate holder 7;

b) (Fig. 10) Here, exclusively the printing plate 6 is heated;

c) (Fig. 11) In this embodiment, exclusively the inking chamber 10 is heated.

In the spirit of the invention, the embodiments according to figures 9-11 may be mutually combined.

The inking chamber 10 is a particularly attractive embodiment. It consists of a housing 11, which in combination with two doctor blades 12, forms a completely closed inking chamber 13.

The ink 14 present in the inking chamber is spread out on and scraped off from the printing plate, simultaneously by both the doctor blades 8.

Because of the particular angle at which the doctor blades 8 are adjusted with respect to the printing plate 6, an "inking gap"of the closed inking chamber is realised, which is particularly advantageous for the use of thermoplastic inks.

The implementation of a closed inking chamber of the type illustrated by figures 9, 10 and 11, creates ideal conditions for the use of thermoplastic inks.

The striking advantages of the process according to the invention and of the closed inking chambers used herein, may be summarized as follows:

a) Since there are no up- and downward movements of both the closed inking chamber and the doctor blade chamber mechanism, these cannot cool

down.

b) Due to the limited amount of used thermoplastic ink which will be used according to the process, maintaining a constant temperature is simpler.

c) Minimum wear of the printing plate, because the pressure of the doctor blade chamber or inkpot on the printing plate is low.

d) Printing plates and ink are easily exchangeable, with very short exchange times.

e) A very economical ink consumption, because the ink losses upon cleaning are very small.

f) Because of the limited amount of used thermoplastic ink, and the absence of an ink tank, the machine more rapidly arrives at operating temperature after switching on, when starting up at room temperature.

CLAIMS

1. Process for inking a printing plate attached to a holder, with a thermoplastic ink, to be used in pad printing, whereby a relative movement is maintained between the holder and an ink tank filled with thermoplastic ink, characterised in that the holder or the ink tank, or both these components are heated at the temperature required for the thermoplastic ink.

2. Process according to claim 1, characterised in that as an ink tank, a heated ink tank is used, with circular or oval doctor blade of a hard material, such as hard metal or plastic material in the shape of a monolithic component of undeformable material, in which at the periphery a circular or oval canal is made for attaching above said doctor blade by snap connection, as well as for attaching above said doctor blade to this component by glueing.

3. Process according to claim 1, characterised in that as an ink tank, a device is used consisting of the combination of a heated ink tank and at least one doctor blade, of which at least the bottom edge which is contacting the printing plate, is adjusted with respect to the printing plate at a negative angle, measured with respect to the inked portion of the printing plate to be scraped off, and without changing the position of the doctor blade, a relative movement of the doctor blade with respect to the printing plate is generated, on the one hand, in a direction to ink the printing plate, and on the other hand, in the other direction, to scrape off the ink from the printing plate.

4. Ink tank to be used in the application of the process according to claim 2, characterised in that it is realised in the shape of a monolithic component of an undeformable material, in which, at the periphery a circular or oval canal is made for attaching above said doctor blade by snap connection, as well as for attaching above said doctor blade to this component by glueing.

5. Ink tank according to claim 4, characterised in that above said hard material is a synthetic substance.

6. Ink tank according to claim 5, characterised in that above said synthetic substance is a polyacetate.

7. Ink tank according to any one of claims 5 and 6, characterised in that above said doctor blade of above said synthetic substance is attached by an adhesive.

8. Ink tank according to claim 4, characterised in that above said doctor blade of above said synthetic substance is attached to the monolithic component by a snap connection.

9. Ink tank according to any one of claims 4-5, characterised in that above said doctor blade, during spraying or casting of above said synthetic substance of which above said ink tank is made, was joined to it.

10. Heated ink tank for implementing the process according to claim 3, characterised in that it consists of the combination of

a) an ink tank for inking the printing plate during a relative movement of the inking plate with respect to this ink tank, and of

b) at least one doctor blade of which the bottom edge which is contacting the printing plate, is adjusted with respect to the printing plate at a negative angle, meaning an angle measured with respect to the inked portion of the printing plate that has yet to be scraped off.

11. Ink tank according to claim 10, characterised in that above said doctor blade is adjusted at a negative angle between substantially 90 and substantially 180°.

12. Ink tank according to any one of claims 10 and 11, characterised in that it is elongated and forms with above said doctor blade an elongated ink gap.

13. Ink tank according to claim 12, characterised in that above said doctor blade and the ink tank are mounted on a common elongated housing.

14. Ink tank according ot claim 13, characterised in that above said doctor blade and above said elongated housing form a whole.

15. Ink tank according to any one of claims 10-14, characterised in that two doctor blades are mounted facing each other.

16. Ink tank according to any one of claims 10-15,

characterised in that above said doctor blade forms a closed circle and that a portion of the doctor blade extends according to above said negative angle.

17. Ink tank according to any one of claims 13-16, characterised in that in above said housing, a heating resistance is mounted.

FIG. 1

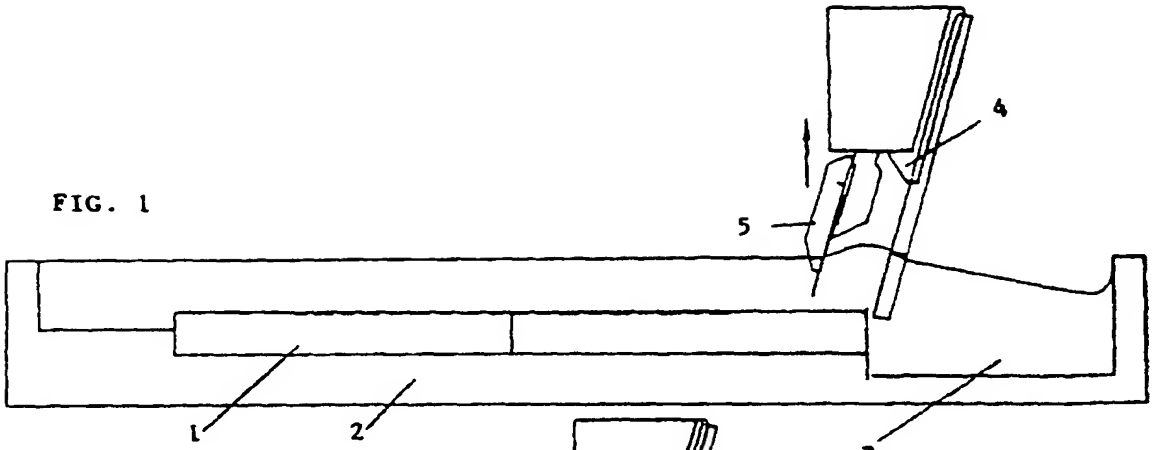


FIG. 2

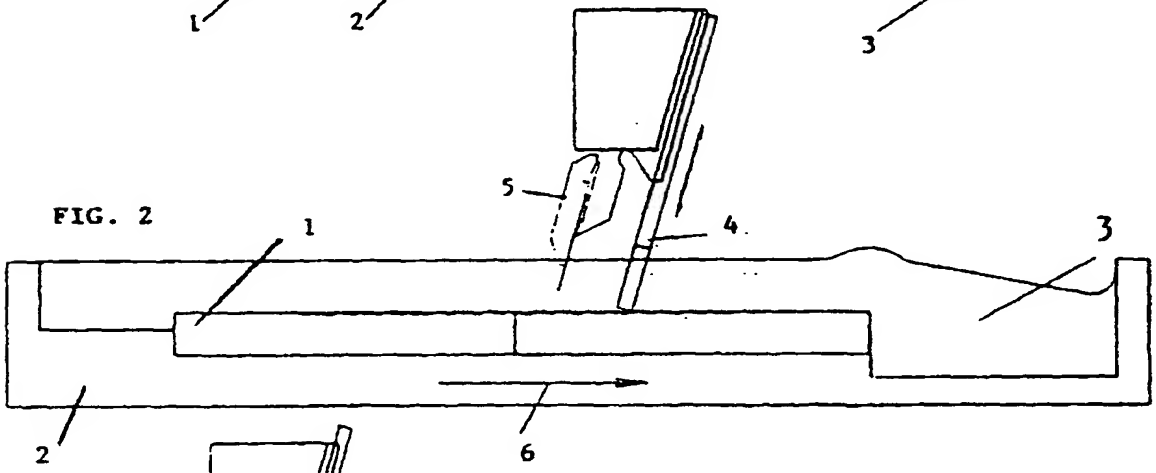


FIG. 3

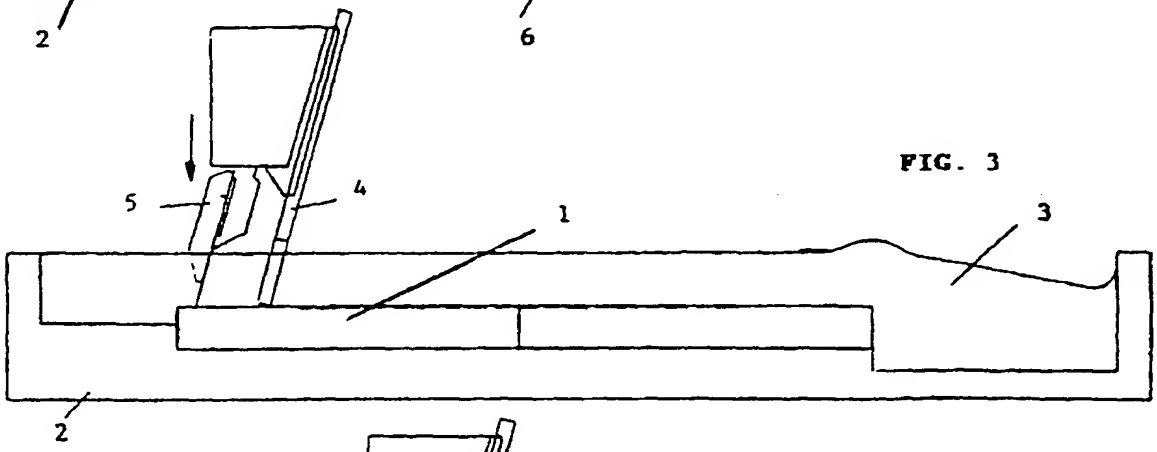
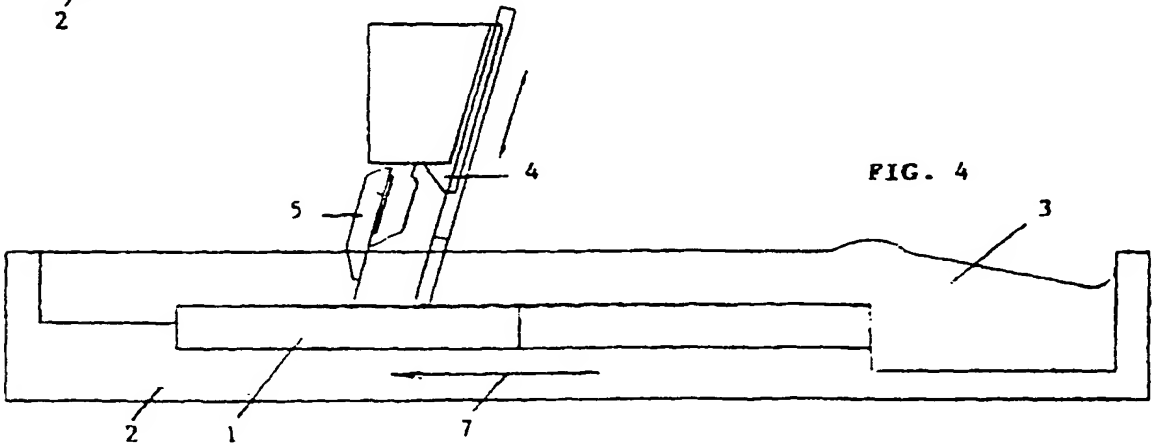


FIG. 4



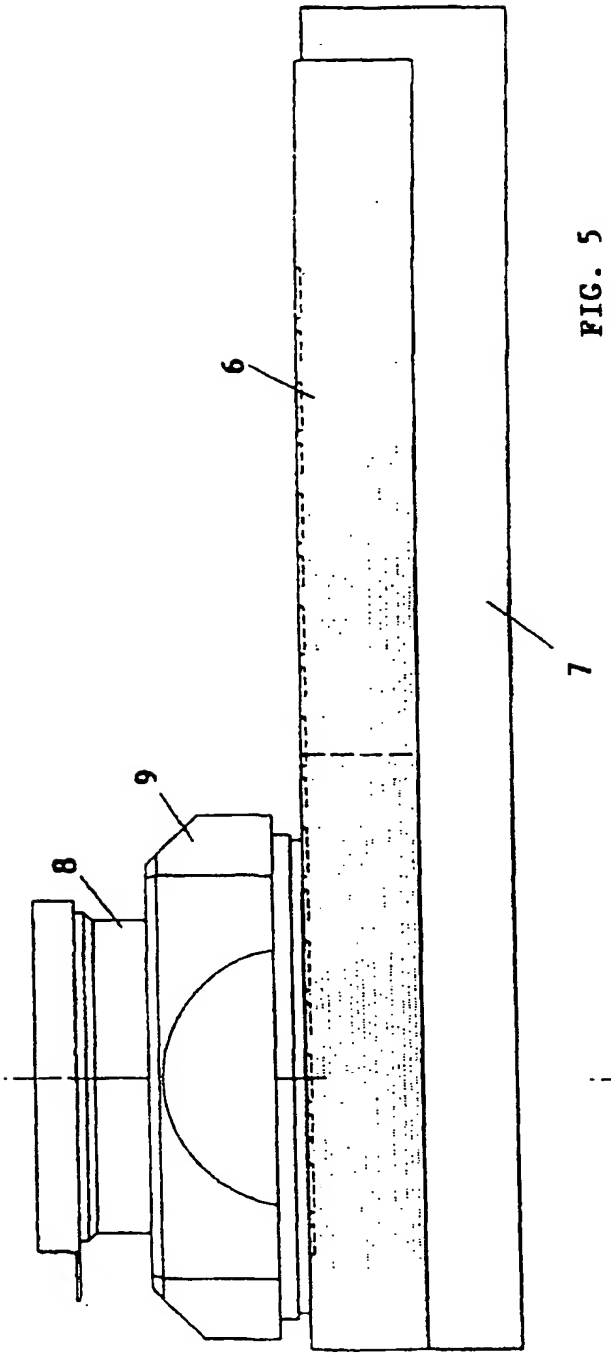


FIG. 5

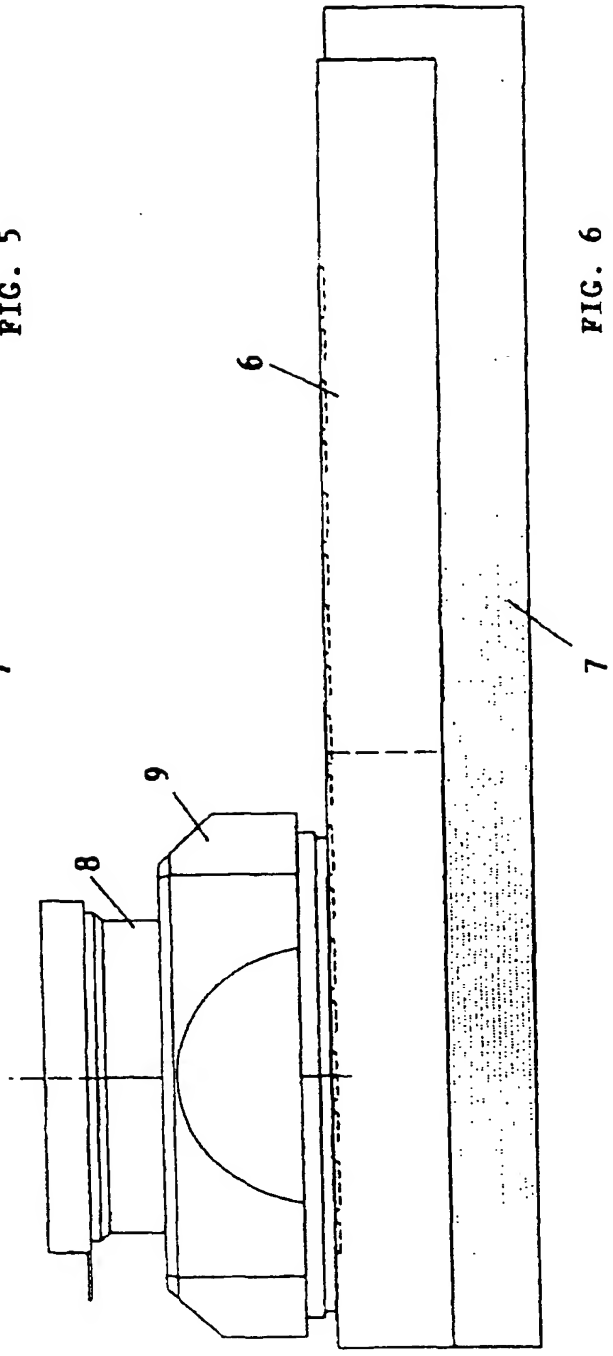


FIG. 6

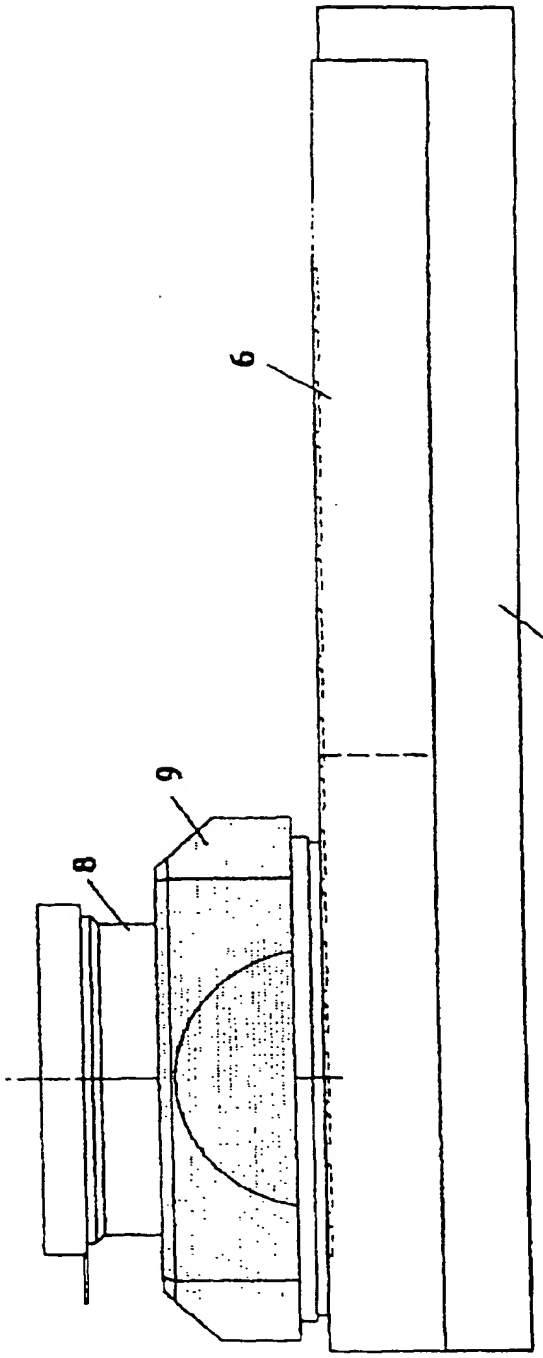


FIG. 7

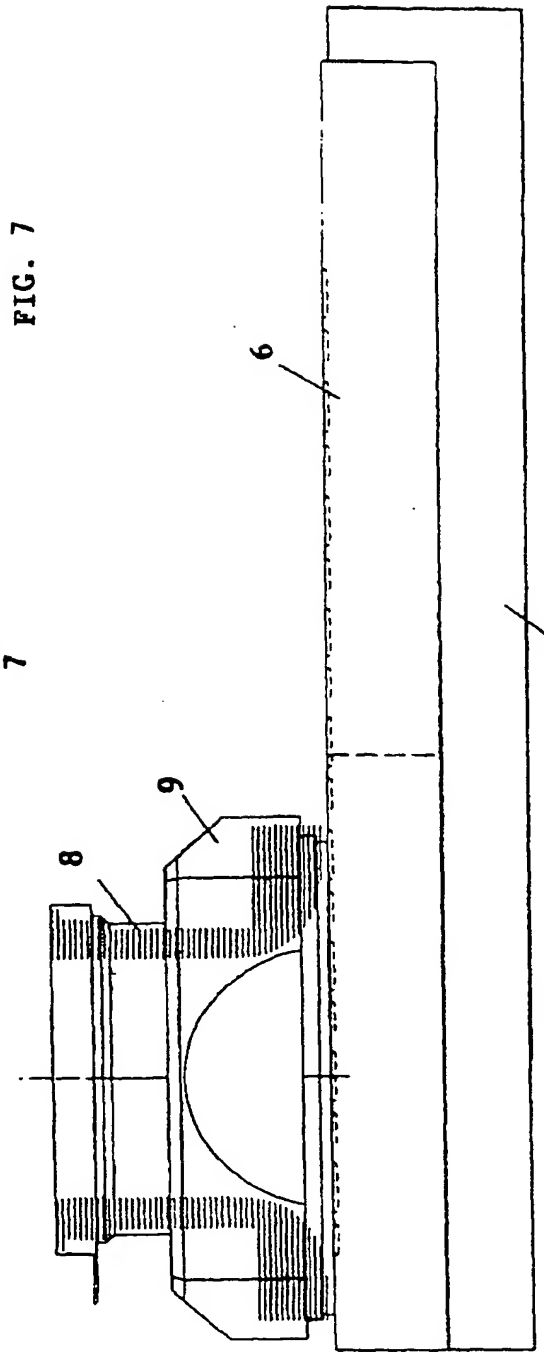


FIG. 8

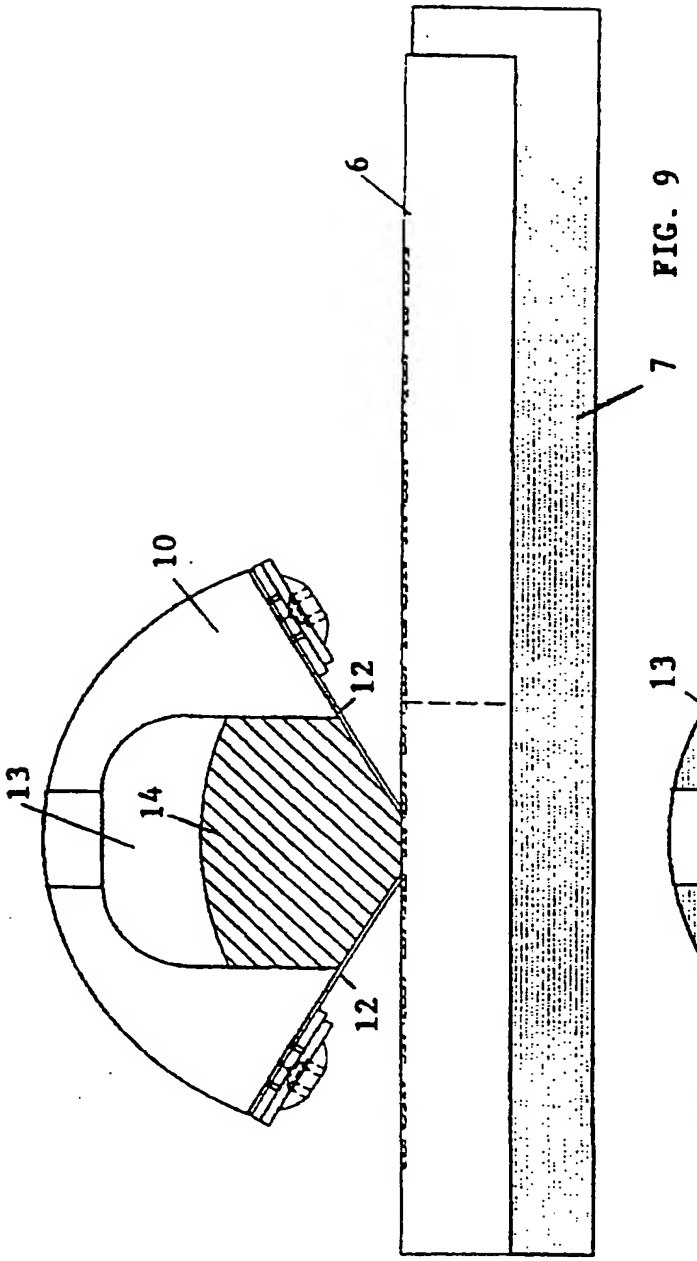


FIG. 9

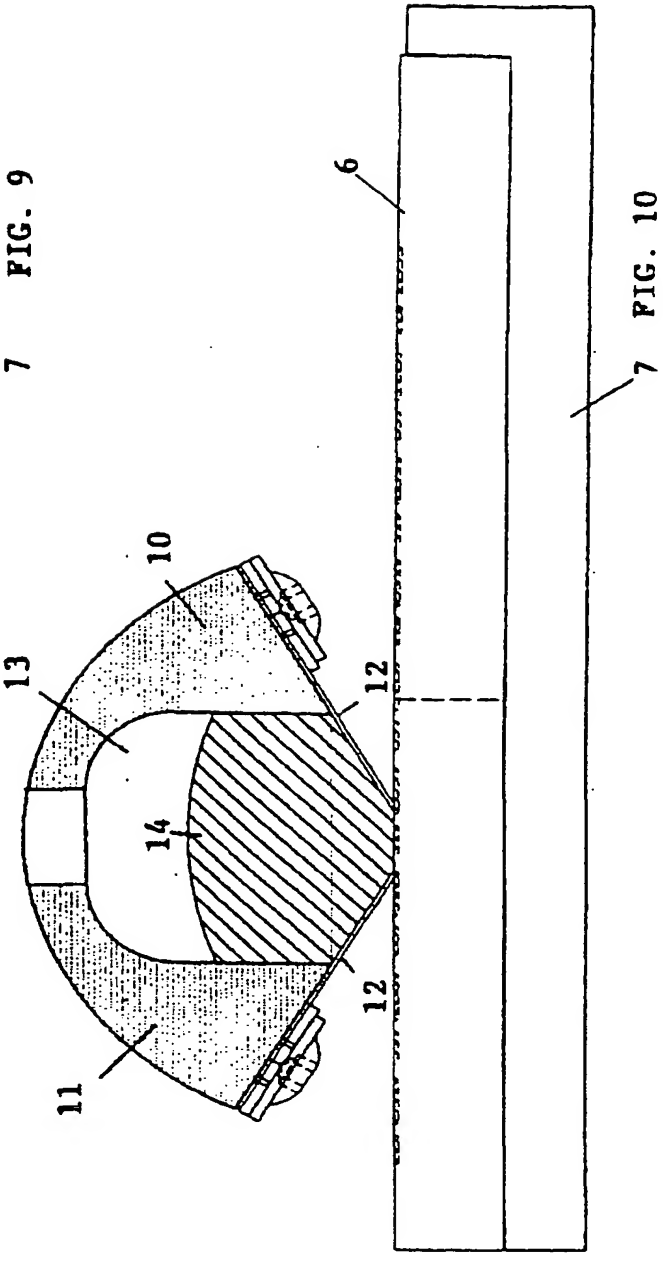


FIG. 10

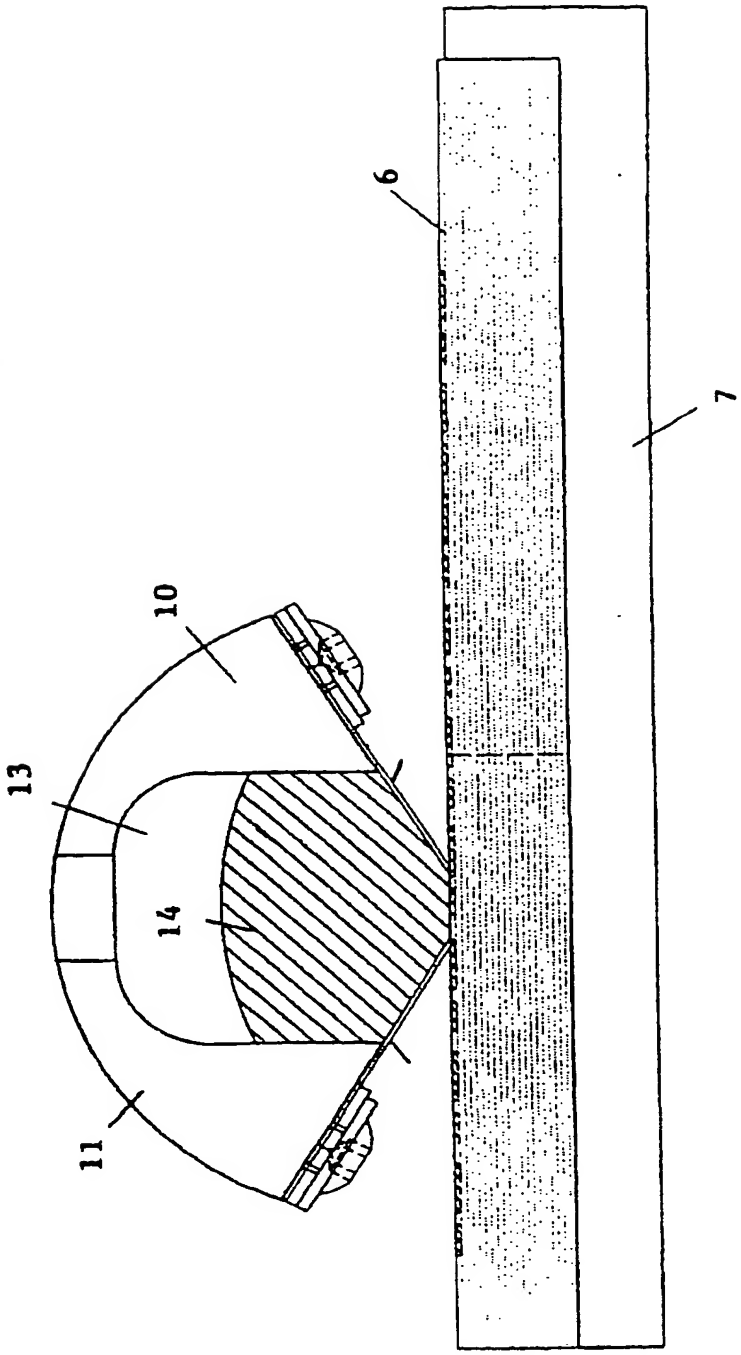


FIG. 11

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/BE 00/00044

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B41F17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B41F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 40 15 684 A (TAMPOFLEX GMBH) 21 November 1991 (1991-11-21) column 1, line 5 - line 27; figures 1,2	1,10, 12-15,17
Y	PATENT ABSTRACTS OF JAPAN vol. 15, no. 491 (M-1190), 12 December 1991 (1991-12-12) & JP 03 213341 A (THINK LAB KK), 18 September 1991 (1991-09-18) abstract	1,10, 12-15,17
P,A	EP 0 917 953 A (PRINTING INTERNATIONAL) 26 May 1999 (1999-05-26) the whole document	1-17

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 August 2000	29/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Deprun, M

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Interna al Application No
PCT/8E 00/00044

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 736 380 A (PRINTING INTERNATIONAL) 9 October 1996 (1996-10-09) column 1, line 54 -column 2, line 21; claim 1; figure 1	1,4-6,10
A	WO 97 37850 A (TECAPRINT AG) 16 October 1997 (1997-10-16) page 4, line 18 - line 29; figures 1,2	1,10, 12-15,17
A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 385 (M-864), 25 August 1989 (1989-08-25) & JP 01 136747 A (SEIKO EPSON CORP), 30 May 1989 (1989-05-30) abstract	1,10,11
A	PATENT ABSTRACTS OF JAPAN vol. 17, no. 623 (M-1511), 17 November 1993 (1993-11-17) & JP 05 193115 A (MITSUBISHI HEAVY IND LTD), 3 August 1993 (1993-08-03) abstract	1,10
A	DE 40 27 587 C (TAMPOPRINT GMBH) 2 October 1991 (1991-10-02) column 6, line 66 -column 7, line 33; figure 4	1,10, 12-15,17

1

INTERNATIONAL SEARCH REPORT

...ormation on patent family members

Intern ...nal Application No
PCT/BE 00/00044

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4015684 A	21-11-1991	WO 9117888 A	28-11-1991
JP 03213341 A	18-09-1991	JP 2565782 B	18-12-1996
EP 917953 A	26-05-1999	BE 1011561 A	05-10-1999
EP 736380 A	09-10-1996	BE 1009272 A	07-01-1997
WO 9737850 A	16-10-1997	AU 2147997 A	29-10-1997
		DE 59701257 D	20-04-2000
		EP 0894049 A	03-02-1999
		ES 2145588 T	01-07-2000
		US 6067904 A	30-05-2000
JP 01136747 A	30-05-1989	NONE	
JP 05193115 A	03-08-1993	NONE	
DE 4027587 C	02-10-1991	AT 108142 T	15-07-1994
		DE 59102113 D	11-08-1994
		EP 0473947 A	11-03-1992
		US 5222433 A	29-06-1993

ENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
7023GD1/PV		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/BE 00/ 00044	21/04/2000	29/04/1999
Applicant		
PRINTING INTERNATIONAL		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 7

   [X] as suggested by the applicant.

   [ ] None of the figures.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/BE 00/00044

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B41F17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B41F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 40 15 684 A (TAMPOFLEX GMBH) 21 November 1991 (1991-11-21) column 1, line 5 - line 27; figures 1,2	1,10, 12-15,17
Y	PATENT ABSTRACTS OF JAPAN vol. 15, no. 491 (M-1190), 12 December 1991 (1991-12-12) & JP 03 213341 A (THINK LAB KK), 18 September 1991 (1991-09-18) abstract	1,10, 12-15,17
P,A	EP 0 917 953 A (PRINTING INTERNATIONAL) 26 May 1999 (1999-05-26) the whole document	1-17

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 August 2000	29/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Deprun, M

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/BE 00/00044

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 736 380 A (PRINTING INTERNATIONAL) 9 October 1996 (1996-10-09) column 1, line 54 -column 2, line 21; claim 1; figure 1	1,4-6,10
A	WO 97 37850 A (TECAPRINT AG) 16 October 1997 (1997-10-16) page 4, line 18 - line 29; figures 1,2	1,10, 12-15,17
A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 385 (M-864), 25 August 1989 (1989-08-25) & JP 01 136747 A (SEIKO EPSON CORP), 30 May 1989 (1989-05-30) abstract	1,10,11
A	PATENT ABSTRACTS OF JAPAN vol. 17, no. 623 (M-1511), 17 November 1993 (1993-11-17) & JP 05 193115 A (MITSUBISHI HEAVY IND LTD), 3 August 1993 (1993-08-03) abstract	1,10
A	DE 40 27 587 C (TAMPOPRINT GMBH) 2 October 1991 (1991-10-02) column 6, line 66 -column 7, line 33; figure 4	1,10, 12-15,17

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/BE 00/00044

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4015684 A	21-11-1991	WO 9117888 A	28-11-1991
JP 03213341 A	18-09-1991	JP 2565782 B	18-12-1996
EP 917953 A	26-05-1999	BE 1011561 A	05-10-1999
EP 736380 A	09-10-1996	BE 1009272 A	07-01-1997
WO 9737850 A	16-10-1997	AU 2147997 A	29-10-1997
		DE 59701257 D	20-04-2000
		EP 0894049 A	03-02-1999
		ES 2145588 T	01-07-2000
		US 6067904 A	30-05-2000
JP 01136747 A	30-05-1989	NONE	
JP 05193115 A	03-08-1993	NONE	
DE 4027587 C	02-10-1991	AT 108142 T	15-07-1994
		DE 59102113 D	11-08-1994
		EP 0473947 A	11-03-1992
		US 5222433 A	29-06-1993